TREATISE

ON

FRUIT TREES.

VOLUME ONE.

TREATISE
ON FRUIT TREES;

INCLUDING

[THEIR] PICTURES, DESCRIPTIONS, CULTIVATION, &c.

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BY THE CONSENT AND FAVOR OF THE KING.

PREFACE.

A study of the works of the Creator, the admiration of nature's wonderful spectacle, is an activity most worthy of the rational man. Regardless of where he is, he won't find anything that doesn't deserve his attention, and nothing that won't stimulate productive thought. But among the infinite variety of objects that form this immense tableau, the ones that should concern him most of all are grain, vines, trees, and cattle, the principal resources for his life, his security, & even his pleasures.

But beyond these valuable commodities, nature offers others, which, though not as essential, can attract attention & are worthy of much care. The pleasure & utility of fruit trees should rank them at the top of this class category. Their fruit, the most brilliant of the riches of summer & autumn, follow their flowers, among the most beautiful ornaments of gardens in the spring. Throughout the entire year they furnish our tables with servings so pleasant that they arouse & stimulate one's taste even at the end of the choicest & most sumptuous meals. The fragrance, freshness, aroma, and the delicacy of fine fruit are qualities recognized by everyone. Even so, there are those who claim that its use is dangerous, and that having it served on expensive dishes doesn't make it less unhealthy. When cold, it can form harsh products

in the stomach that interfere with digestion, cause bad chyle, and bring on persistent fevers, often due to worms. In my *Botanico-Meterological Observations* I've reported some well-established facts that absolve fruit of these accusations. Several distinguished physicians have fully cleared it of the blame that instead ought to fall only upon the excesses of those who give themselves up to their appetites and indulge them without moderation. If I were not limited to a preface that has to be very short, I would readily show that this delicious & unique food inherited from our forefathers has become harmful only because there are those who partake of it without restraint.

Nevertheless, I'm careful not to advise everyone to eat all kinds of fruit indiscriminately. With this food, just as with any other, everyone should decide how to use it, both in terms of quantity as well as quality, based on his own experience. But it likewise would be thoughtless of me to wish to ban all fruit from our tables unconditionally. I appeal for this to those of all ages & groups who have consistently sought after fruit., Even while I was engaged in matters of highest priority - the cultivation of land, storage of grain, reforestation, &c. (*) - the promise of their support, as much as my own relish for good fruit, has led me to collect in our gardens the best species of fruit trees, to describe them, to have them drawn by the most capable artists with a view to creating the work that I now offer to everyone.

(*) The Elements of Agriculture, 2 vols. *in*-12; Treatise on Storage of Grain, 2 vols. *in*-12, & Treatise on Woods and Forests in 8 vols. *in*-4°. Available at L.F. DELATOUR, Bookseller, rue St. Jacques.

But the high cost of the engravings made me give up this project, & the material remained forgotten in my office for over twenty years. In the end they were shown to an expert (*) who worked in the same area & who shared the same views, and he hoped to be able to put them together into a finished work. The difficulties that stopped me did not seem at all insurmountable to him. I didn't hide the fact that various important tasks left me only a little time for this job. He enthusiastically offered to collaborate with me on finishing the descriptions and the incomplete drawings & to add whatever was missing from one or the other. He offered to allow me to fulfill the commitment that I had undertaken to provide the public with this treatise that complements the one on Trees & Shrubs.

The plates were done by the most accomplished engravers of this kind. Different hatching styles are apparent because there was too much work to be done by a single artist. Nevertheless they achieved a degree of perfection seen in very few works. This convinced the publishers to spare no trouble or expense, with the result that there is nothing left to be desired in the printing of this treatise. We will present a brief summary of it.

Taking a look at most of the orchards and espaliers that are planted with fruit trees, it’s surprising that something so appealing could be so remote from perfection, especially in the choice of species & their cultivation.

(*) M. LE BERRIAYS.

Regarding the choice of species, there are those who plant trees to derive income from the fruit; on the lookout only for financial gain, they prefer fruit that is premature or too large. These two qualities are the ones that determine their choice, since they are more important for selling the fruit than for their delicacy. You can't blame them; they've chosen the best way to meet their expectations. Others plant trees for their personal use & to furnish their homes. They often decide on the number of species they should introduce in their gardens according to *la Quintinye*, who suggests basing their choice on the merit & value of each kind. Nevertheless, if the advice of this noted author is followed, there would be planted in the same orchard sixty-five musk mallows [*ambrettes],* the same number of winter thornbushes [*epines d'hiver],* and seventy *echasseris,* all of which have mediocre fruit, & only twenty-four St. Germain pear trees*,* whose fruit is much superior to those we've just named. Several landowners likewise settle on their personal tastes that often aren't the most usual ones, but when you work on your own, you have to take charge and follow your own conscience. Finally, others rely entirely on their gardener, who often turns the decision over to the nurseryman he likes. The latter, more concerned with his own sales than with the interest of the landowner, will supply the species that he has the most of in his nurseries.

Leaving aside these motives based on personal interest, it's admittedly not easy to offer good advice to someone who wants to create a sizeable planting, even to one who consistently makes a study of fruit. Taste is a personal & independent faculty that is not subject to any rules. So each individual is allowed to prefer one fruit over another.

Some state a preference for soft fruit, while others prefer crisp ones. Some fruits deserve to be chosen above all the others, independently of the whims of taste. Granting that, it seems that a general rule could be made to choose the better fruit rather than the average ones. As natural as that seems, we daresay that such a rule has its limits. For example, someone who in fact planted only wild strawberry bushes, Montmorency cherry trees, Dauphine plum trees, Great Mignonne peach trees, butter pear trees, &c. would have fruits widely reputed to be the best. But every year he will undergo long periods of scarcity, & nothing goes against good economy more than stocking up abundantly on the best fruit of all for several months & then remaining deprived for the rest of the year. It would seem to be more reasonable to plan carefully for a succession of fruit, so that even if there isn't always an abundance in excess, there never would be a severe lack. So since it's impossible to have exceptional fruit the whole year, at least make sure never to be without the ordinary ones. That's the way to use nature's gifts wisely. To be certain of having these resources, plant species & varieties of trees whose fruit follows in succession from the earliest to the latest, thus adjusting the number of each type to the requirements of the season in which it ripens. A planting won't accomplish its objective at all when the fruits of too many trees ripen all at the same time, yielding only a short-lived surplus and lacking species with fruit that continues on until new ones appear.

The planting still is incomplete if it consists only of the choicest fruit within each season. These fruits, ordinarily fine, are subject to failure. They must be supplemented by fruits of lesser quality but that give more substantial & more consistent yields. Some fruit is needed for compotes & for preserves. Indeed, fruit that's most enjoyable when eaten fresh doesn't always do best when sweetened in sugar. A compote of morello cherries or of St. Germain pears wouldn't be preferable to one made from ordinary cherries or Martin-sec pears. In the same way, preserves made from clingstone apricot & mirabelle plums are more highly regarded than those from large apricots or Dauphine plums.

These very common faults among plantations arise because most landowners don't know the different kinds of trees well enough to make good selections on their own. Few gardeners even know them sufficiently well, & virtually none of them take the trouble to collect them for their proprietors' gardens.

We've undertaken our *Treatise on Fruit Trees* mainly to facilitate and disseminate this knowledge. We absolutely do not intend to make a long list of all of the good, average, and poor fruits. We've omitted all the cider apples and pears, and all grapes that are suitable only for wine. The only subject covered in this treatise is fruit for the table. And even though we've chosen the best species from among the latter, & have left out many

of the better-known ones that didn't deserve to be, we don't advise anyone to grow all of the ones we've mentioned. Some of them only are fruits to be wished for, others will succeed only in particular climates or in certain soils, and others are suitable only for displaying variety in an orchard or a fruit shop. But the list had to be long enough to satisfy all tastes and to describe for everyone the ways that fruit can be used.

Our goal is to survey over three hundred varieties of trees during all seasons of the year, to observe closely & capture the moment when each of their products is at the point that determines their quality, to evaluate these products by examining the shape, color, aroma, the changes that occur with age in their strength, the condition of the tree, the quality of the soil, exposure, and air temperature, and to distinguish regular features from unnatural ones. The extent & the details of these objectives haven't discouraged us at all. We were sustained by the desire to create a work useful to everyone, & we expect that our observations will provide the information with the necessary clarity. This undertaking had lots of difficulties to overcome; the comments below will point them out.

1°. Each tree has an aspect & a manner, so to speak, that is unique to it. Indisputably, this results from characteristics that distinguish one tree from another. An expert noticing them is impressed. But these subtle distinctions can't be perceived through illustrations, nor by discussion. And the one is aware of them

likewise can't describe them precisely to another.

2°. The budding shoots of trees distinguish one type from another very well; a pear tree from a plum tree, & even some varieties, a winter pear, for example, from a cresane bergamot. But in quite a few varieties these distinctions aren't so great; they can be thought of as negative characteristics that tell which variety it is *not*, rather than as positive features that precisely identify this or that variety. Gardeners, especially those are dedicated to cultivating nurseries, claim that they can recognize almost all trees, and especially pear trees, just by their shoots. They may recognize them within the gardens or the nurseries where they grow them, because the characteristics of bud shoots rarely vary inside the same area. Nevertheless, we've noticed several times that skilled nurserymen have been mistaken about fruit tree varieties that had been removed from their nurseries only a few days previously. We concede that a nurseryman, who can be compared to the head of a large family, living as he does among the trees that he has watched being born & growing up, trees that he has planted, grafted, shaped, &c. should recognize them, even independently of their shoots, even though the latter can help him identify a number of species. But it certainly is not possible to identify distinctive features for peach trees, & it is very difficult for the other kinds, by examining only the shoots, at least for the large majority of varieties of fruit trees. The uncertainty will increase if the shoots have been taken from different nurseries,

because the soil, the exposure, the age and vigor of the trees, the different stocks on which they've been grafted, all produce differences that embarrass the greatest experts to such a degree that they can't handle it.

3°. Flower buds, by their size, their shape, & the shape of their stalks, offer quite obvious differences for identifying a number of varieties. The greengage, for example, has stalks larger than those of any other kind of plum. But for many trees these differences are too small to use as distinguishing features, especially if one examines the fruiting buds in all varieties of the same species. But the size & shape of the flower buds are less likely to vary than are the color & size of the shoots.

4°. The size, shape, and shade of color of flower petals in certain species such as the peach tree, can permit one to distinguish one variety from many others. But it requires study and dedication to master these frequently minor distinctions.

5°. The leaves of trees identify their species better than do the parts that we've just mentioned. Many varieties of a species can be recognized by their leaves. But some of these characteristics are shared by several varieties, & the leaves on the same shoot aren't always the same shape and color. That's why

we've seldom described the leaves on shoots. Rather, we've kept to the large leaves on fruiting branches whose size, shape, and color are better established. We've described the small leaves that accompany the large ones only when they reveal something exceptional. The dimensions that we've assigned to the leaves, as well as to other structures, should not be taken too rigorously. A vigorous young tree planted in good earth with a northern exposure will have much larger leaves than a tree that is old or in decline, or one that is exposed to strong sunlight in poor soil. Our decision to give dimensions for healthy leaves on trees in good condition allows us to compare leaves from different species or varieties of trees.

In conclusion, an examination of shoots, flower buds, or leaves alone leaves much uncertainty about the species or varieties of the trees. But by collecting & combining the observations on these structures, the majority of species and varieties of fruit trees can be distinguished from one another.

6°. The same factors that produce variations in the characteristics of other parts of trees also can alter the fruit. But these alterations never make all of the fruit of a tree unrecognizable. If the quirks of nature, terrain, exposure, &c. hide

some of these from view, they won't be able to detract from discrimination by taste. If a Louise-bonne pear happens to look like a St. Germain on the outside, there won't be any uncertainty once the fruit is opened. The size of the seeds and the pits that enclose them identify the St. Germain, and its taste will further dispel any doubt. The same can be said for the winter pear compared with the Imperial, the Dauphine plum to the small greengage, the purple peach to the clingstone nectarine, the pear-apple to the gray pippin apple, &c. We conclude that in cases where the outsides of some fruits are deceptive, their aroma, the time that they ripen, and their internal characteristics will identify them.

So the characteristics of fruit, their shape, size, color, aroma, consistency, & time that they ripen, are more pronounced, better defined, and more reliable than those of other parts of the tree. That's why the Latin phrases that precede each variety of tree usually refer only to the qualities of the fruit.

If this treatise had been written for botanists, they could fault the length of most of our phrases, & take it ill that only very few of them were taken from illustrious authors whose own phrases are quite widely accepted. Here are the reasons why we departed from this principle:

1°. Since it's impossible to describe in a few words the common features of a species, as well as the individual characteristics that are unique to each of its varieties, we have tried

to achieve our objective without shortening the phrases by leaving out some of the words. We intend to cover the characteristics of each variety of tree with a single Latin phrase whose terms often are more precise & appropriate than those of our own language. But we didn't feel that we needed to force our phrases to comply with botanical rules & regulations. So in our discussion we preferred the language of gardeners to that of scholars, using terms with the ordinary meaning given to them by practitioners of the art, & not those with the strict precision used by botanists.

2°. Besides, the most extensive botanical works fall quite short of including all of the types of fruit trees described in this treatise. So phrases used by the botanists often could apply to several varieties and sometimes even to several species. For example, the phrase *Pyrus sativa, fructu Autumnali, suavissimo, in ore liquescente.* [*Translator's note:* cultivated pear, autumn fruit, ….] INST. Does it describe the butter pear tree any better than several others whose most pleasant and tender fruit ripens in the autumn? Similarly, *Prunus fructu cerei coloris.* [*Translator's note:* plum with …colored fruit] INST. doesn't describe the Sainte-Catherine better than some other kinds of plums, such as the mirabelle whose fruit is the same color. So we haven't been able to make use of most of the botanists' phrases.

Some experts would have preferred a new nomenclature. But would that be of any use? It's true that the names of several trees vary from one province to another, but a new nomenclature,

far from correcting the problem, would add to the confusion even more. It's certain that gardeners always will prefer the names that they've got from their proprietors, and that they've been used to since childhood, to those that we might put in our treatise. So a uniform nomenclature hardly can be hoped for, though doubtlessly that would be desirable. We agree that most names of trees are meaningless. But can we hope to create names for them in our own language that express their nature and their qualities? Have the people whom we look up to as our superiors in matters of taste actually done better at naming trees? Are *Uva Apiana, Pyra Dolabelliana* better than fly pear and Orleans plum? For this reason we've kept the common names. When a tree has several names, we've indicated them, taking care to list first the one that's used the most. To a great extent, the liberties that have been taken with changing plant names have obstructed the progress of botany, or at minimum have made its study very difficult.

It certainly would be useful to be able to tell definitively which one is the species and which is the variety. But those who have studied the natural history of trees must agree that this is impossible for trees that take a long time to bear fruit & even longer to reproduce from seeds. If you can see that a grain of wheat produces wheat, a grain of rye produces rye, and that a grain of barley produces barley, then you are entitled to conclude that wheat, rye, and barley are separate species. We have tried similar experiments on fruit trees,

but they take too long to repeat the same way as is done very easily with annual plants. So they've only made us realize that seeds produce a great number of varieties. One would be inclined to believe that the pear tree constitutes a single species, the apple tree another, the cherry tree another, and all the rest really are varieties. But in a work like this they all should be called *species* because one variety can be very valuable whereas another can be worthless. It's clearly impossible to trace them back to their ancestral origins, & it would be absurd to try to list the trees in their genealogical order, if I may be permitted that term. [*Translator's note:* in today's world, these relationships could be clarified by DNA analysis.]

Only two arrangements are left for us to adopt: the season in which they mature, & in alphabetical order.

By arranging them in the order in which they mature, we would have grouped together all kinds of trees that have no relationship to one another, & we would have discarded all the ways in which they are alike. So we preferred to arrange the genuses in alphabetical order, as in the *Treatise on Trees and Shrubs,* of which this is merely an extension. We believe that we've satisfied every wish by inserting a table in which all the species & varieties of each genus are listed in alphabetical order as well as in the order of their maturity, so that one will know which fruits can be enjoyed in each month of the year.

We couldn't avoid saying something about cultivation, but we have

limited ourselves to basic principles that everyone can put into practice. We won't say anything at all about frames, glass panels, greenhouses, changing the quality of the soil, & all of the extremely costly forms of cultivation that are available only to the very few landowners wealthy enough to afford them. They have the means to get capable & intelligent people who gladly will dedicate their skill & labor to satisfy the desires of those who can afford to pay them. Books & information on this topic would be as useless for the very rich as they would be for individuals who don't have sufficient resources for such projects.

We'll likewise avoid getting into high-level research, which would be simply unrealistic. For example, several scientists have tried to analyze soils to determine their fertility. Unfortunately the results of their work never have squared with reality.

So we think that every grower should limit himself just to knowing if the ground is dry or moist, hard or loose, friable or compact, sandy, loamy, or clayey. These qualities can be judged sufficiently well by hand & by eye, and the fertility of the soil can be determined better & more reliably by experience than by the most sophisticated analyses.

We thought it essential to cover at some length the ordinary cultivation of fruit trees in a general way: raising them, grafting,

planting, pruning, &c. & to point out particular ways to cultivate each species, although without claiming to write a complete treatise on this subject. We won't even begin to criticize the poor practices that are perpetuated by many gardeners. Some of them know how to avoid them and to validate with success the benefit of new methods that they've developed.

So we'll be satisfied to explain the mechanics of carrying out basic methods & the simplest practices based on principles, sound observations, & on the experience of gardeners who are not nor expect to be geniuses but whose accomplishments can satisfy the experts. We'll refrain from discussing the mechanisms of seed germination, the development of branches & roots, the success of layering and cuttings, the union of grafts with their stock, the healing of wounds on trees, the formation of cambium layers, the effects of pruning, &c. Those interested in getting this information can look up our discussion of it in *The Natural History of Trees* where it's more suitably located.

In this treatise we are limiting ourselves to information that is absolutely necessary for a gardener, or for someone who doesn't feel it beneath him to become one, whether to care for his trees himself or to judge how well they've been managed by someone else. As a result, he will be in a position to invite his friends to join him in sharing the gifts that hard work can derive from nature, & that are augmented, perfected, & embellished by his diligence.

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[*Translator's note*: the French alphabetical entries and names of the trees and their varieties are kept in their original alphabetical order. English translations of the alphabetical entries, and of the tree varieties whose English names have been identified, are in brackets. N.B. The page numbers referenced within this index are those in the author's text and not the ones on the website.]

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Double de Troies.
Madeleine blanche.
Véritable pourprée hâtive.
Alberge jaune.
Pavie Alberge.
Chevreuse hâtive.
Vineuse.
Grosse Mignonne.
Madeleine rouge.
Belle Chevreuse.
Bellegarde.
Pavie blanc.
Chanceliere.
Pêche d'Italie.
Pêche-Malte.
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Petite Violette hâtive.
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Bourdin.
Admirable.
Rossanne.
Belle de Vitry.
Teindou.
Teton de Vénus.
Chevreuse tardive.
Brugnon violet.
Pêcher à fleur semidouble.
Royale.
Nivette.
Violette tardive.
Madeleine tardive.
Pourprée tardive.
Persique.
Pavie rouge.
Pavie jaune.
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Gros blanquet rond.
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Ognonnet.
Sapin.
Deux-Têtes.
Bellisime d'été.
Bourdon musqué.
Blanquet à longue queue.
Petit Blanquet.
Gros hâtiveau.
Poire d'Ange.
Sans-peau.
Parfum d'Août.
Chere-Adame.
Fin or d'été.
Epine-rose.
Salviati.
Orange musquée.
Orange rouge.
Robine.
Sanguinole.
Bon-Chrétien d'été musqué.
Gros Rousselet.
Poire d'oeuf.
Cassolette.
Grise-bonne.
Muscat royal [royal muscatel pear].
Jargonnelle.
Rousselet de Reims.
Ah! mon Dieu.
Fin or de Septembre.
Inconnue Cheneau.
Epine d'été.
Poire-Figue.
Bon-Chrétien d'été.
Orange tulipée.
Bergamotte d'été.
Bergamotte rouge.
Verte-longue.
Beurré.
Angleterre.
Doyenné.
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Jalousie.
Franchipanne.
Lansac.
Vigne.
Pastorale.
Bellisime d'automne.
Messire-Jean.
Sucré-vert.
Mansuette.
Rousseline.
Bon-Chrétien d'Espagne.
Crasanne.
Bezi de Caissoy.
Doyenné gris.
Merveille d'hiver.
Epine d'hiver.
Louise-bonne.
Martin-sec.
Marquise.
Echassery.
Ambrette.
Bezi de Chaumontel.
Vitrier.
Bequêne.
Bezi d'Hery.
Franc-réal.
Saint-Germain.
Virgouleuse.
Jardin.
Royale d'hiver.
Angleterre d'hiver.
Angélique de Bordeaux.
Saint-Augustin.
Champ riche d'Italie.
Livre.
Trésor.
Angélique de Rome.
Martin-Sire.
Bergamotte de Pâques.
Colmars.
Bellisime d'hiver.
Tonneau.
Donville.
Trouvé.
Bon-Chrétien d'hiver.
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EXCERPT FROM THE REGISTRY
of the Royal Academy of Sciences.

of the twenty-eighth of June, 1768.

MESSIEURS DE JUSSIEU & FOUGEROUX DE BONDAROY, having been assigned to examine a work of M. Duhamel entitled: *Treatise on Fruit Trees, including their Pictures, Descriptions, Cultivation, &c.* and having completed their report on it, the Academy has deemed this work worthy of publication. In recognition thereof, I have hereby signed this Certificate. Paris, June 28, 1768.

GRANDJEAN DE FOUCHY, *Permanent Secretary of the Royal Academy of Sciences.*

AUTHORIZATION OF THE KING.

LOUIS by the grace of God, King of France & of Navarre: To our beloved & faithful Counsellors, the Keepers of our Courts of Justice, Court of the Earl Marshal, Chief Counsel, Provost-marshal of Paris, Bailiffs, Seneschals, their Civil Magistrates, & to others of our Judicial Officers to whom it may concern, GREETINGS. Our well-beloved MEMBERS OF THE ROYAL ACADEMY OF SCIENCES of our fine City of Paris have informed us of their need of Our Letters of Authorization for the printing of their Works. THESE REASONS MOVING US THEREUNTO, and wishing to deal favorably with the Petitioners, We have authorized, and do now authorize, them by these Presents to have printed, by whichever Printer they will wish choose, all of the Research or daily Observations, or annual Reports of all of the proceedings of the the Assemblies of the said Royal Academy of Sciences, the Works, Treatises, or Memoirs of each of its Individual Members, & generally everything that the said Academy will wish to publish; after having examined the said Works, & finding them worthy of being printed in such volumes, format, margins, characters, conjointly or separately, & as often as it will seem right to them, & to have them sold & distributed across our entire Kingdom, during a period of twenty consecutive years counting from the date of these Presents. Nevertheless, some of it may be printed by others not belonging to the said Academy, outside of the conditions for the Works specified above. We hereby prohibit all manner of persons, whatever their rank & station, from importing a foreign edition to any location under our dominion. We likewise prohibit all Booksellers & Printers from printing or causing to be printed, selling or causing to be sold & distributed, the said Works, in whole or in part, & to make no translations or excerpts of them for any reason whatever without the express permission in writing of the said Petitioners, or of those who will have been granted rights by them, under penalty of confiscation of the counterfeit Copies and a fine of three thousand pounds against each offender, of which one third will go to Us, one third to the Central Hospital of Paris, & the other third to the said Petitioners or to those who will have been granted the rights on their behalf, & all expenses, damages, & interest, upon condition that these Presents will be fully registered in the Registry of the Society of Booksellers & printers of Paris within three months

of this date, that the said Works will be printed within our Kingdom & nowhere else, on good quality paper & in clear letters, in conformity with the Regulations of the Bookseller. Prior to their release for sale, the Manuscripts or Imprints used as copy for the printing of the said Works will be handed over to our most dear and faithful Knight Sir DAGUESSEAU, Chancellor of France, Commander of our Orders, of which two Copies subsequently will be placed in our Public Library, one in that of the Château du Louvre, & one in that of our aforementioned very dear and faithful Knight Sir DAGUESSEAU, Chancellor of France, all of which under pain of nullification of the said Presents. The contents of which We inform & charge you to put in the possession of the said Petitioners & their agent fully and peaceably, without allowing them any distress or hindrance. Our wish is that the copy of these Presents, printed in its entirety at the beginning or at the end of the said Works, be retained and notice of it be duly served & added in good faith to the copies collated by one of our cherished & faithful Counsellors & Secretaries, as it was to the original. We forthwith order our Bailiff or Sergeant in pursuance of this command to perform all of requisite and necessary acts without seeking further permission, notwithstanding any Hue and Cry, Norman Charter, & Letters to the contrary; because such is our pleasure. GRANTED in Paris the nineteenth day of the month of March, the year one thousand seven hundred fifty C.E., & of our Reign, the thirty-fifth. By the King and his Council. *Signed,* MOL.

Registered in Registry XII of the Royal Trade Council of Booksellers and Printers of Paris, No. 430, folio 309, in conformity with the Law of 1723, article 4, that prohibits all persons, whatever their status, other than the Booksellers & Printers, from selling, distributing & advertising any books to be sold, whether they claim to be the Authors or anyone else. Upon condition that the aforementioned Council be furnished with eight copies of each one, as prescribed by article 108 of the same Law. Paris, June 5, 1750.

Signed, LE GRAS, Trustee.

TREATISE

ON

FRUIT TREES.

GENERAL CULTIVATION OF FRUIT TREES.

CHAPTER ONE.

On Nurseries.

The most common & natural way that trees propagate is by seeding, & it's the only way they have to diversify their species. But seeds of fruit trees ordinarily produce only wild or degenerate varieties whose harsh & unpleasant fruit is more suitable for animal fodder than it is for human food. And if once in a while a genuine tree emerges, the enjoyment of this unique specimen will be limited to one owner & to the lifetime of that single tree, unless it can be perpetuated and transmitted to future generations by grafting it

to wild stocks that will give it their juices & their vigor without transferring their flaws.

Whoever takes up the cultivation of fruit trees must have a nursery with all of the wild types or stocks on which individual trees are grafted.

Of the wild trees, certain ones, namely the peach, almond and apricot trees, are grown only from seeds. Others, the plum, pear, apple, cherry, & occasionally wild cherry trees, are propagated by seeds & by suckers from their roots. Some are propagated by seeds, layers, & even by cuttings. These include quince, mahaleb cherry, & the Doucin and Paradise apple trees.

Having explained everything about nurseries in detail in the *Treatise on Seed Propagation* & in *The Natural History of Trees (a)*, I will repeat here only what is necessary or directly related to my topic.

ARTICLE I. *On the right kind of soil for a nursery.*

It's a mistake to believe that trees raised in poor soil are easily restored & quickly recover their strength when transplanted into fertile & well-cultivated ground. Such trees, emaciated, twisted, stunted, scabby, covered with moss, and lacking good roots, will languish a long time or perish, mostly choked by an excess of nourishment too strong & too substantial for their delicate fibers & organs. It's another mistake to believe that a tree raised in good quality soil, moist, manured, fertilized, & well tended, will bear up successfully when transplanted into scanty dry soil of mediocre quality.

(a) These two works are part of the *Complete Treatise on Woods & Forests* in 8 vols. *in*-4°. fig. Available at L.F. Delatour, bookseller, rue St. Jacques.

Going from feast to famine, it will fall into decline & expire.

So to set up a nursery let's choose good free soil, more dry than moist. If it's rocky, or just gravelly, it must be dug up during the summer to a depth of two feet & sieved. If it's not rocky or gravelly, this procedure isn't necessary but it's still very beneficial.

If the soil needs to be reclaimed, this must be done with new soil of good quality mixed in while trenching, and not with manure. Not only because in manure the only roots that form are small, black, weak & in poor condition, but in addition the manure attracts white worms that damage the roots & often kill the young trees.

After this preparation, the ground is left to settle until mid-March or the beginning of April, or at minimum until November. (Some gardeners recommend letting it settle for a year.) Before filling it with young plants or seeds, it's tilled lightly to get rid of weeds. Unless the soil is really bad, which I doubt, by doing what we've said you can count on the trees growing up well there and then succeeding in all soils where they are to be transplanted.

ARTICLE II. *On Seed Planting.*

I. ALMONDS intended for planting should be germinated during winter so that they emerge from the ground early in the spring & run less risk of being eaten by field mice, magpies, crows, jays, &c.

Some poke the almonds into the ground, pointed end down, one right next to the other. They don't put any soil on top of them at all,

instead, they cover them with a board loaded with large stones. If this operation is carried out in December or January, there is enough moisture in the ground to germinate the almonds, which will be ready for planting in April.

Alternatively (& this is the more usual practice) others put a two-inch layer of thick moist sand & a layer of almonds in a bucket, small basket, a cask broken out at one end, or other container. They place it against a wall with a southern exposure; when there are severe frosts, they cover it with litter or put it inside a conservatory, cave, or cellar. They take care to inspect the almonds from time to time, to wet them a little if the sprouts don't begin to appear by February, or to keep them drier if the sprouts are too long. It's essential that they germinate before being planted, but that they don't get too far along, because it's very hard then to get them out of the sand & to plant them without breaking a lot of the plumes or newly formed stems, or at minimum the roots & coma, if they've already developed. Of course, almonds already spent after forming these structures can't produce any new ones.

Nurserymen put almonds & other pits in sand only from the 1st to the 15th of January. If sand is not available, friable soil can be used.

At the beginning of April, furrows two-&-a-half to three feet apart are marked by lines on the area prepared for seeding. In good weather the almonds are taken out of the sand and the radicle is cut or pinched to make a good starting point for roots, rather than allowing it to form a taproot that would make it very difficult & uncertain for the trees to take root again after transplanting. They're placed in a hamper & brought to the location where they're to be planted. Some gardeners make holes with a peg twenty or twenty-four

inches apart in rows marked by a garden line. They put the almonds in them three or four inches deep at most, cover them with earth with the point of a dibble, & tamp down the earth gently by foot, assuming that it's not moist enough to hold together by itself. The seed germs won't take long to sprout, & after the end of August or mid-September of the same year, a portion of the young almond trees will be sturdy enough to be dormant bud grafted for dwarf trees. The weaker ones will be bud grafted in the next or in the third year.

It's reputed that almond trees of Provence with soft wood are subject to gummosis, & that peach trees grafted onto stocks derived from bitter almonds produce a lot of wood & little fruit. I myself always have tried to procure local almonds, the largest ones that are sweet & fresh, & that have hard wood. Bear in mind that seeds thriving in our climate produce trees that are less delicate than those grown from seeds coming from a warmer climate, & that trees produced by seeds from almond trees with thick & hard wood are hardier than the others. Lacking precise data, I generally hold to these views. Nevertheless, I've used almonds from Provence successfully in years when the ones in our own gardens have completely failed. Some nurserymen claim that seeds must not be planted in the same ground that produced them, & they've shown that grafts don't succeed well on stocks grown this way. I have no evidence for that.

II. Pits of peaches, plums, & apricots are treated the same way as almonds. They're allowed to germinate in sand, and they're put in the ground the same distances apart and at the same depth. Peach tree stocks for the most part are strong enough to be dormant bud grafted for dwarf trees after the end of August of the same year.

Those of plum & apricot trees ordinarily are able to take bud grafts only in the second year. However, if apricot pits are put in to soak at the beginning of January in clear water that's changed & renewed every two or three days, about three weeks later the pits will appear to be partly opened by the swollen kernels. They then are planted in pots or containers full of good soil and placed on window ledges of a conservatory or other building with a southern exposure. They're protected from frost by bringing them inside or covering them when the air gets too cold. The plant will have sprouted from the soil before the end of February. It's left to grow and to strengthen until about mid-April and then lifted with its clod of earth for transplanting to its intended location. It's tamped with water, protected from the sun for several days, and watered several times during the summer. These stocks, more than a month further along than ones raised by the usual method, acquire enough strength to be grafted starting in the same year. But these procedures are suited only for those individuals who are able to carry them out, and who need only a small number of stocks.

III. The pits of cherries, wild cherries, and mahaleb cherries also are put in thick, moist sand during winter. In March, when the hard frosts are over, small trenches, about two inches deep and four or five inches apart are dug in the ground prepared for seeding. The pits, mixed together with sand, are sown in the troughs. They're all covered up with half an inch of soil, provided it's of good quality, loose, and friable; or even better, use an inch of compost from an old manure bed, leaf compost, marc of grapes, or old pigeon manure. When the seedlings are sturdy enough to be put in a nursery, which normally happens from the first year on,

they're pulled up, the taproot is cut off or shortened, and they're re-planted the same distances apart as are the almond trees. It's better to do this transplant in autumn than in spring. They're grafted when they've acquired the strength & height suitable for grafts of dwarf, half-standard, or standard trees. Sometimes the pits, or at least some of them, only come up in the second year, especially if they were not put into the sand soon enough or kept sufficiently moist to promote their germination. Young wild cherry trees that grow in the woods make extremely good stocks when transplanted to nurseries.

IV. The seeds of pears, apples, and quinces likewise are layered in sand. But since they germinate more easily than do pits, the sand should be kept not as moist & the seeds should be located where it isn't so warm, so that their germination won't be too far along in March when they're put in the ground. They're sown like cherry pits, but not quite as deep. (It's more usual to take marc of pears & apples from cider presses, dry it out, sieve it, spread it evenly on the prepared ground, & cover it with about half an inch of light mellow soil.) In the third year the seedling is pulled up to cut off its taproot and replant it in a nursery.

One can spare oneself the effort of this initial cultivation by transplanting & cultivating pear or apple tree seedlings pulled up from the woods, where many of them sprout from seeds.

As to the osseous pits of the azarole & hawthorn trees, they are placed in a hole dug in a garden or other ground deep enough to cover them with eighteen inches or two feet of earth. They are left there until the second subsequent March, i.e. for about fifteen months.

Then they're removed from the hole & planted like cherry pits in rows about one inch deep.

Note. 1°. One often should visit & inspect the planted area to chase off magpies, jays, &c. that sometimes pull out the plant just when it's sprouted over two inches above the ground. Some nurserymen cover their seed beds with straw litter to protect them, at least until they've sprouted; after that, the straw must be removed.

Note. 2°. When seeds that haven't germinated are planted in the ground & there's a concern that they may be destroyed by field mice, it's a good idea to sow dried kidney or broad beans between the rows. While the mice are having a good time eating the beans on which they're very keen, the seeds will germinate & thus stay protected.

ARTICLE III. *On Rooted Suckers.*

Stocks of cherry and plum trees are rarely grown from pits. Rooted suckers that grow abundantly from the bases & roots of these trees are preferable. When the suckers are the size of one's little finger, they are pulled up, taking care to spare their roots. But the joint or butt, or the part of the root that produced them and that sometimes remains attached when they're pulled up, is cut off. They're planted twenty or twenty-four inches apart in furrows five to six inches deep and the width of a spade, aligned two-&-a-half to three feet apart. The furrows are filled in, covering the roots with earth that is tamped down by foot. This planting is done in the autumn. In mid-February or at the beginning of March, the whole sapling is cut back almost to ground level so that it will produce new growth.

During the summer care must be taken to pinch off all of the shoots that come out of the plant, leaving only one, or at most two, that will strengthen and be suitable for accepting a bud graft in August of the same year, or of the following year which is more usual.

Since plum trees with thinner bark are preferred, suckers are taken from the cherry plum, large damson, or absent these, from the small black damson, & especially from the bullace. Nursery gardeners claim that *violette* and *chevreuse* peach tree grafts succeed well only on the bullace. Other kinds of peach trees adapt to the damson.

However, the large number of shoots & suckers put out by plum and cherry trees, especially by those that themselves have been raised from suckers, can damage trees grafted upon them & are very troublesome for growers. It would be far better to raise these trees from pits, especially if they're sown in their permanent locations. The taproot is not cut off at all; (it must be left intact on all trees that are not to be transplanted) & the roots will be much less likely to spread out. At minimum, it would be advantageous to set grafts very close to the roots on stocks raised from suckers. When the graft has produced a shoot about a foot long, it's earthed up, and left to take root. Then the tree is lifted, the entire stock is cut off, & the graft is re-planted with its own roots. All of the suckers coming out will thus become independent trees that will not need to be grafted.

The stumps of pear & apple trees in the wild and old pear & apple trees in orchards produce a lot of suckers & shoots from which very good stocks can be made, treating them the same way as those of plum and cherry trees.

ARTICLE IV. *On Layers.*

STOCKS of quince, mahaleb cherry, Doucin apple, & Paradise apple trees are grown more customarily from layers than from seeds. To produce a lot of them, parent stocks are created; i.e. in the autumn or at the beginning of spring a large tree that one wants to propagate is cut flush with the ground. The earth is cleared away a little around the stump so that the shoots will emerge as low down as possible. In spring a large number of them appear that get to be two to three feet long in by autumn. At that time the shoots & the stump are earthed up with four or five inches of soil. Even better, a small trench five to six inches wide & of equal depth is dug around the stump. The shoots are laid in it and held down if necessary with wooden hooks. The trench is filled in, and the earth is tamped down firmly by foot, simultaneously holding up the tip of each shoot so that it's kept perpendicular to the ground. During the summer the trench is covered with litter or with ferns to keep it fresh, & it's watered several times during dry spells. The following autumn, or by the second year at the latest, the shoots are quite sufficiently supplied with roots so that they can be separated & planted in a nursery. Nevertheless the stump will produce new ones & can continue to provide them for the next twelve or fifteen years.

ARTICLE V. *On Cuttings.*

FIG TREES, currant bushes, quince trees, Paradise apple trees, mahaleb cherry trees, &c, are propagated further by cuttings.

From healthy and hardy trees (*a*) take straight, vertical rather than lateral branches, that are one, two, or three years old (*b*), with live, uniform bark. Cut off approximately one-foot lengths. With the fingernails pinch off any buds from the part that has to go into the ground, but retain their stems (*c*), or the small swellings at the origins the buds. If there are some small branches, cut them back to a half-*ligne* [*Translator's note:* the *ligne* was a former measurement of length equivalent to 1/12 of an inch] from their insertion point. Plant (*d*) the branches prepared this way four to six inches deep and a similar distance apart from one another, in free, very loose, mellow soil, or even soil that has been sieved, without compost (*e*) or manure. Tamp it down by hand or by foot. Cover the soil with litter (*f*). Wrap the part above the ground in moss held on loosely with thread or wicker. Water it plentifully. Set up boards or straw mats on the south side (*g*) to protect the cuttings from the sun. Water lightly but often to maintain the moisture necessary for growth. Remove the protection from the sun only when the success of the cuttings is assured (*h*) by the presence of shoots that already are large & robust. This procedure

(*a*) The branches of a weak and debilitated tree cannot furnish the growth and sustenance that cuttings must generate. Vertical branches are more vigorous and full of sap than the horizontal ones are.

(*b*) Branches from the last sap run are extremely delicate and transpire too easily.

(*c*) The bud stems and the rings where they insert into the branches contain a lot of sap and are suitable for rooting.

(*d*) The cuttings must be planted and not just shoved into the ground lest the bark come off, fester, and soon transmit the decay to the rest of the cutting.

(*e*) Compost & manure prevent the soil from packing closely and fully encompassing the cutting.

(*f*) Litter prevents the soil from being beaten down and hardened by watering, & it keeps it moist. Moss keeps the cuttings from drying out and from excessive transpiration. Cuttings take root well under a bell-glass because there they have moisture, warmth, and transpire almost not at all.

(g) The sun and putrefying moisture are the two greatest enemies of cuttings. Thus it would be very bad to place them at the base of a terrace wall or at the base of a very high wall. But they would do even worse in the sun, which will dry them out and kill them quickly.

(*h*) A few leaves or small branches

is done before the (*a*) sap begins to run. The following autumn the rooted cuttings are lifted for planting permanently or in a nursery.

For tree cuttings that take root easily, such as quince and Paradise apple, it's sufficient to plant them in loose soil sheltered from the sun and that's cool, or kept that way by a few waterings.

Other methods & more detailed instructions on this subject are found in *The Natural History of Trees*. Fruit tree stocks that are forked, twisted, or only of passable strength are grafted with dwarf or low-stemmed trees from three to six inches above the ground. Those that are vigorous and inclined to grow straight are raised to be grafted with half-standard trees of three or four feet & standard trees of five to eight feet. One should take care to cut off their lateral branches to ensure that they grow straighter and more uniformly. But this pruning must be done bit-by-bit & successively, & not all at once. The weak branches can be left where they are, and the strong ones cut three or four inches from the trunk, or twisted to prevent them from getting stronger & taking over. The following year they're cut even with the trunk. Since, as I've shown in *The Natural History of Trees*, branches and roots grow in proportion to one another & that the more branches a tree has, the more the roots grow, so that if all of the tree's branches were cut off, it would become thin & not develop any substance at all.

The stocks on which plum, pear, apple, & even cherry trees are grafted all can be grafted as

that sometimes develop rapidly on cuttings are merely doubtful indications of their success, and that deplete their sap before they're able to form roots.

(*a*) If some onset of running of the sap is suspected, the cuttings must be pruned, left exposed to the air for several days but sheltered from the sun, and then planted.

dwarf trees. Standard & half-standard trees are formed from shoots put out by the grafts, whereas the main part of other trees should develop from the stock.

Stocks on which a bud graft has failed should be cut back below the spot where the graft had been, so that new wood will grow on which the graft will succeed better than it had on the old. But stocks that had been grafted for dwarf trees, if they tend to grow up straight, can be preserved intact & set up for grafts of standard & half-standard trees.

Nurseries are tilled in January and February & are given two or three second hoeings during the summer to keep the soil loose and to get rid of all the weeds. But in warm climates, & where the trunks of stocks are infested with vine grubs & other bud-destroying insects that sometimes show up from the beginning of February on, it's better to postpone the tillage & to not eliminate the weeds until the buds on the trees have developed. That way the insects will find food on the ground and won't climb up the trees to devour the buds, especially those on grafts. Only very light tilling and second hoeing should be done on new seedbeds.

Although nurseries require strenuous work only for tilling, they do need almost constant care. The ways to assure their success are to protect them from destructive foraging by game and wild animals, to protect the seedlings of Doucin & Paradise apple trees from field mice that gnaw their roots, fasten the first shoots of grafts to stakes when they don't grow up straight, and to prune, cut back, and nip buds, and to clean off moss & insects. Maintain and strengthen some of them, correct the defects in others, and constantly keep a lookout for the welfare of these young pupils.

ARTICLE VI. *On Grafts.*

§1. *Names and Proper Times for Grafts.*

Three types of grafts are used for fruit trees, namely the bud shield graft, the crown graft, & the cleft graft.

1°. Young or old stocks are grafted with bud shields, but on wood of the current year, or at latest two years.

This graft is performed at the onset of or during the run of sap in the spring. So it's been called the *shoot,* or *immediate growth bud graft,* because if the bark appears to be alive & especially if the bud is enlarging twelve or fifteen days after grafting, the stock is topped two or three inches above the point where the graft was inserted, & the developing bud on the graft puts out a shoot beginning in the first year.

It's more customary to bud graft during the decline of the second run of sap. This must be taken literally, especially for stocks of resinous trees. If they have too much sap when they're bud grafted, resin seeps out around the graft, pushes it out & detaches it, or drowns it, as the gardeners say. As long as the bud grafts can be lifted & the bark separated from the stocks, there will be enough sap for grafts to be successful. In warm & dry areas the second run of sap rarely holds out beyond the beginning of August, except for young peach & almond trees, in which it lasts about a month longer. In cool areas, young peach & almond trees keep their sap until mid-September, & sometimes even beyond. In other stocks, it stops a month sooner. So depending on the region, old peach & almond trees & other stocks are bud grafted from mid-July until mid-August, & young peach & almond trees from mid-August until mid-September.

Bud grafts performed at this season are called *dormant bud grafts* because the bud remains inactive as though it were sleeping until spring. In mid-February the stock is cut off half an inch above the graft. Peach & almond trees are grafted well only by means of dormant bud grafts.

If there are only a small number of stocks available for grafting & a drought has halted the run of sap before its usual time, pour several pailfuls of water on their bases, & a few days later the sap will resume its run.

If pruning of the stocks has been overlooked, this cutting must be done only during or after bud grafting, & not the day before or a few days before, because the trees will lose their sap.

If bud grafts of a rare or valuable type are obtained when there is no more sap in the stocks, look for suckers on the same kind of trees that retain their sap very much longer and set the bud grafts on them. In the following year they will provide healthy branches that can be grafted.

2°. Crown grafts are performed on stocks over two inches in diameter during the run of sap in spring, when the bark of the stock can detach easily.

3°. Cleft grafts are done on stocks that are at least the width of a thumb, before the first run of sap in the spring when the bark of the tree is very adherent, i.e. about mid-February or sooner.

But the success of all types of grafts depends on three things: the stock or wild tree on which the graft is made; the graft itself, or the part of the tree that is grafted onto the stock; & the operation or insertion of the graft onto the stock.

§. 2. *Properties of Stocks.*

Stocks should be healthy, vigorous, with bark that is alive, clear, smooth, & without any scar on the spot where the graft is to be set. There's no hope for a tree that's grafted onto stocks that are weak, debilitated, cankered, stunted, &c. Furthermore, the stock should correspond to the graft. The union of the graft with the stock is easier & more stable to the extent that they correspond size, properties, & timing of the sap run. A very vigorous pear tree like the *ambrette* will not succeed well on a quince tree with small leaves, and even indifferently so on the Portugal quince which, though it has a much greater abundance of sap, still doesn't have enough for this pear tree that succeeds well only on its own kind. A cherry tree graft won't take firmly on a wild cherry stock with small, dark fruit whose sap, apparently too acrid, is virtually incompatible. A plum tree won't adapt to an almond in full bloom at a time when the sap of plum trees has hardly started to run. In dealing with the particular cultivation of each fruit tree, I'll note on which stock it must be grafted.

During the autumn, stocks must be trimmed of all branches below the point where the grafts are to be placed the following spring. This pruning is performed in spring only for those that should be grafted at the decline of the second sap run.

To set the graft, choose a spot on the stock that is smooth and has no knots or scars.

A graft on a stock of the same family & the same name, even though it's a wild one, is called a *greffe sur franc*. The term is used for a pear tree grafted on a wild stock from the woods or on one grown from a seed, a fig tree grafted on another fig tree, a cherry tree grafted on another cherry tree, &c. All of these are spoken of as a *greffe sur franc*. When the stock has a different name, even though it comes from

the same family, it's called by its own name: so one would say a peach tree grafted on an almond tree, an apricot tree grafted on a plum tree, a clingstone apricot tree grafted on an apricot tree, an apple tree grafted on a Doucin apple tree, a cherry tree grafted on a wild cherry tree, &c.

Some gardeners claim that setting a graft onto another graft of the same variety or of the same species increases the amount of fruit & improves its quality. I've never been able to detect such benefits. But an interstock with an intermediate relationship between the graft & the stock can produce good results. Grafting a quince tree onto a wild stock of a pear tree & then a separate pear tree onto the quince graft can make the tree bear fruit more quickly. It even might be necessary in a region where quince trees do poorly & where only medium-sized pear trees are required. First grafting apricot trees onto plum trees & then peach trees onto the apricot tree grafts is an expedient procedure for several kinds of peaches, & especially for the white peach.

§. 3. *Properties of Grafts.*

GRAFTS must be taken from fully developed trees that are neither too young nor too old, fully productive, and healthy & whose species is well defined & authentic. This last quality deserves attention, particularly for trees that sometimes are propagated from seeds that are prone to vary & almost always degenerate the species. There's a great difference between an authentic *mignone* peach, a genuine greengage plum, and their varieties. The descriptions that I'll provide for each tree will allow this distinction to be made. And since the wood & the leaves of most fruit trees don't have characteristics sufficient to distinguish between a species and its varieties, and often not even between one species and another,

the trees from which the grafts are to be taken must be identified and labeled during the time that each one is fruiting.

Branches intended for cleft & crown grafting should be straight, healthy, with good-looking bark presenting attractive buds not too far apart from one another, wood of the past year & of the year before that, and of moderate strength. (Stunted branches & suckers are not suitable for any fruit tree grafts.) The branches must be collected in the spring before the sap first begins to run, i.e. in January, February, or sooner. Their large ends are buried two or three inches deep in the ground in a location facing north & protected from the sun so that their sap doesn't begin to run before they are to be used. They are covered during severe frosts, especially the ones from trees that bear fruit with pits. Only shoots from the past year can be used, but since they're delicate & transpire easily, one should avoid letting them dry out before they're joined to the stock.

Bud grafts are taken from well-conditioned shoots from the last run of sap well supplied with good buds & of moderate strength. Stunted & very frail branches must be rejected, because it's difficult to lift bud grafts from them, and suckers as well because the lower buds near where the branch starts are liable to be dormant, i.e. never open at all. Others open up & form handsome shoots, but the trees that develop from them are thought more likely to produce wood than fruit.

To make bud shield grafts, the largest & best-shaped buds toward the middle of the shoot are chosen. For peach & other trees that have simple buds, choose doubles, i.e. a flower bud next to one for wood, & triples, i.e. a bud for wood between two flower buds, or a flower bud between two for wood. Unless the flower buds will be nipped off, these are preferable

to simple buds, which are merely wood buds that are too committed to their fate & produce too few fruitful trees.

When shoots are cut, or even before, the delicate tip must be removed, as well as all of the leaves up to the end of their stalks. These parts transpire too much, and if they're kept the shoots soon would lose their sap. Furthermore, they have to be wrapped in damp moss, fresh grass, or a wet cloth, or their large end kept in water. When they need to be transported a long way, or kept for several days, the large end is inserted into a cucumber or other fruit and completely wrapped in damp moss.

When grafts are collected, branches of the same species or of the same varieties must be bundled together and labeled, tied with cords of different colors, or marked in some other identifiable way.

In addition, they must be grafted consecutively, numbering those of the same species or varieties, & a record or list kept that corresponds to the labels or the numbers in the nursery.

If one isn't careful about these points & also about all the ones we've mentioned beforehand, one runs the risk of making a mistake in choosing the right species, of displeasure at having grown trees that are slow to bear fruit, or that produce only those of poor & mediocre quality, and to blame the soil, the stock, the cultivation, the inclemency of the seasons, &c. for faults that can be blamed only on the carelessness of the grafter.

§. 4. *Insertion. Different ways to do it.*

I. *CLEFT GRAFT. Fig.* 1.1°. The stock is sawed horizontally. The cut is trimmed with a pruning knife, a drawknife, or other very sharp instrument, mainly where one wants to insert the graft.

The cutting edge of a pruning knife, or of a billhook if the stock is a large one, is positioned on the diameter of the cut. The stock is split vertically by hitting the top of the instrument with a mallet. The cleft is split an inch & a half or two inches down, & if the stock is a large one, a wedge is used. The inside of the cleft is cleaned & smoothed if fibers are present.

2°. The large end of the graft *A* (its wood should be two years old) is trimmed at an angle, an inch or an inch & a half in length. A couple of small contractions usually are cut above the top of the angle & care is taken that the side facing the center of the stock is slightly thinner than the one that faces the bark. The graft is cut back to two, three, or four buds, depending on the strength of the stock.

3°. To set the graft, the cleft in a small stock is opened up with the point of a pruning knife, & in larger ones with a wooden wedge, or with an iron tool well known to grafters. It consists of a bar or handle with a wedge at each end. The angled end of the graft is inserted into the cleft in the stock so that the phloem of the graft makes contact exactly with that of the stock, or that the intermediate layer between the wood & the bark of the stock is precisely opposite the intermediate layer between the wood and the bark of the graft. Contact between the phloems, on which the success of the graft depends, doesn't necessarily result from matching up the exterior surfaces of the two barks, since the bark of the graft & that of the stock are rarely the same thickness.

Some insert the graft *Z* into the cleft obliquely so that the point of its wedge penetrates slightly & the top remains outside, with the result that the phloems cross each other and at least make contact at the point

where they intersect, which is sufficient for the graft to take. But it's better if the contact is made along the entire length of its wedge.

Once the graft has been set, the two sides of the cleft are allowed to come together. If the stock is a rather large one, their force will be sufficient to grip the graft tightly. If it isn't, it's fastened with a small osier tied to the stock at the insertion point.

A dressing fashioned from a mixture of red earth or clay & cow dung is applied on the cut in the stock & on the insertion point & secured with a piece of old cloth. The dressing is formed as well from a little mortar of mud and straw plus the mixture of earth & cow dung.

Small stocks are set with a single graft, medium-sized ones with two, & large ones with four, making a second cleft that cuts the first one at a right angle. It's actually preferable to insert the latter two grafts between the wood & the bark (in crown graft fashion) rather than in a second cleft, if it's not too inconvenient to do the operation in two stages.

If the stocks are extremely slender, an equal sized graft can be selected & set so that the two inside edges of the bark of one make precise contact with the inside edges of the bark of the other.

Furthermore, when the stock and the graft are the same, or almost the same size, the inverse of the above procedure can be done, i.e. cut the end of the stock into a wedge, split the large end of the graft *C*, and fit the two together so that either one of the two inside edges of the bark of one contacts the edge of the other, or both inside edges match up with the bark of the other, as shown in *D*. This method of grafting is called *fork grafting*. The same dressing is applied as in ordinary cleft grafting.

II. *CROWN GRAFT. Fig.* 3. 1°. The base

of the graft *O* is trimmed in the shape of a toothpick or on a slant an inch or an inch & a half long.

2°. The stock is cut with a saw & smoothed as with the cleft graft. Space for the graft is made by inserting a wedge of bone or of hard wood, with the same shape as the graft, between the wood and the bark of the stock, when its sap is running.

3°. The wedge is pulled out & the graft inserted in its place so that its cut surface & the edges of its bark make contact with the cambium of the stock. Take care when inserting the graft between the wood & the bark of the stock that the graft's bark doesn't separate from its wood; it's essential for this type of graft, & for the cleft graft, that the graft's bark remains attached. Grafts are set this way all around the cut stock three inches apart from one another.

4°. The incision in the stock is covered the same way as for cleft grafts.

If the bark of the stock is split by the action of the wedge, the graft still will succeed, provided that it's tied with a ligature. Instead of separating the bark with a wedge, vertical strips *Q* of bark, of the same dimensions as the cut surfaces of the grafts, can be peeled down without separating their lower ends from the stock. Place the cut surfaces of the grafts against the cambium of the stock, and cover them up with the bark strips. Fasten all of it with a cord & dress it. With this procedure, there's no risk at all of the grafts' bark coming off while they're being inserted.

The bark also can be split vertically at location *P* where the wedge is to be inserted, so that it doesn't tear unevenly. Still, this will have less of an effect on the success of the operation than on its neatness. Instead of cutting through the entire bark, it's preferable to slit only the outer layers; the inside layers are more supple and will yield more easily to the motion of the wedge. This precaution can prevent the bark from being completely torn up.

The crown graft, which doesn't work on stocks in nurseries but rather on large trees already in place, sometimes grows with such energy that it needs to be propped up against the wind, the rain, & the weight of its own leaves, that could loosen it. Cleft grafts often require the same precaution.

III. *BUD SHIELD GRAFT.* 1°. The graft *L, Fig.* 4. to be lifted is merely a piece of bark with a bud on it. It's cut into a shape resembling a shield in an old coat-of-arms, from which it gets its name.

Each person lifts it according to the method with which he is most familiar. Some lift the graft together with a little of the wood that they subsequently remove with the point of a grafting knife. Practice & experience have made some grafters very skilled at removing the bud shield with so little wood on it that there is no need to cut it off. An objection to this method, the one most commonly used, is that the viscous material inside the bark often is liable to be damaged. But more of a concern, & more usually done, is cutting & damaging the bark itself that is essential for preserving the viscous material, as we'll see below.

Others cut the piece of bark *R* while on the branch, & grasping it with the thumb and index finger, detach it from the wood. But if sap is not running in the branch, the bark can be damaged, and frequently the bud is separated from the small woody filament attached at one end to the cambium layer of the branch with the other end extending into the bud. Since this woody filament represents the germ of the tree that must grow from the graft, there never will be any growth if it stays behind on the branch & the bud graft is lacking it.

Finally, others cut the piece of bark on the branch. Inserting the end of a very thin & very small grafting knife between the wood & the bark, they cut the woody filament, that is extremely delicate,

without injuring the bark, which can be done with the blade of the grafting knife as in the first procedure. This way they easily lift the bud shield with the entire bud. It's true that the viscous material can be affected; but a good grafter assured me that he not only doesn't lift his bud shields any other way, but further that he often purposely has passed the tail end of the pruning knife between the wood & the bark of the stock three or four times after having detached them. This doubtlessly altered the viscous material a great deal, as much in the graft as in the stock, without his losing any of his bud grafts, which after all were well prepared. This shows that the viscous material is not as important as believed, even though it's very beneficial to preserve it, especially for trees susceptible to gummosis.

2°. A horizontal incision *a e* is made in the bark of the stock, & from the midpoint of this incision a vertical one is cut downward *i o*, the two incisions being equal to or slightly larger than the corresponding dimensions of the graft. The bark is separated on both sides of the vertical incision with a fingernail or with the handle end of a pruning knife.

3°. With the point of the bud graft placed at point *i* on the intersection of the two incisions, it is inserted downward between the wood and the bark so that its entire inside surface contacts the woody surface of the stock, taking care that the base of the bud shield directly joins the upper edge of the horizontal incision & that the insides of the barks match up as seen at point *K*.

4°. It's all tied up with several turns of osier bark, or with a double cord of wool or of cotton. Avoid tying it on top of the bud on the graft. The ligature can be removed six weeks or two months after inserting the graft.

Instead of cutting the horizontal incision *a e* at the top end *i* of the vertical incision, it can be cut through the bottom end *o*, & the bud graft shaped as shown in *N*, with its base below the bud, & its point above.

This method has its advantages. 1°. To push the bud graft up between the wood and the bark of the stock, one's finger, or the handle of the pruning knife, is pressed only against the stalk of the bud & there is no risk of wearing down or bruising the bud or of breaking or tearing the stalks of the leaves as there would be in the conventional method if the graft doesn't slide in easily. 2°. If two bud grafts are placed on opposite sides of a single stock, one by this method and the other by the conventional method, the horizontal incisions will be at alternate positions, and the stock will be harmed less than if they were situated opposite one another with the bark cut almost all the way around at the same point.

Bud grafts, especially those developing right away, sometimes are dried out by the sun. To avoid this problem, a piece of paper is fastened over them.

Grafting must be done in good weather, since grafts that have been wet by the rain are liable to fail.

If there's lots of grafting to be done, the work can be shared by two: one person trims & prepares the grafts, the other works on the stocks. If there are three, one makes the incisions in the stock, another lifts & inserts the bud grafts, & the third ties the ligatures.

When the bud grafts have grown a shoot seven to eight inches long, it's a good idea to pinch it off at the fourth or fifth leaf so that three or four branches grow out of the leaf axils, which will be very advantageous for the shape & for the first pruning of the trees. For standard and half-standard trees that should develop from the shoot of the graft, the shoot is pinched off only when it has reached the proper height.

From the time that the grafts have begun to sprout until the trees are actually transplanted, the nursery must be periodically inspected, as much to do the necessary cultivation & tilling as to cut off branches

that the stocks usually put out both above & below the grafts. But this cutting should not be severe on very strong stocks; it's preferable to cut only some of the branches & just to twist the others to keep them from taking over until the grafts become vigorous enough to consume all of the sap.

Nota. 1°. Shoots from which one wishes to lift immediately developing bud grafts should be cut in mid-February or shortly thereafter & the large end planted with a northern exposure, protected from the sun, to a depth of only two inches, because buds that have been in the ground won't succeed as well as the others. Bud grafts whose buds have been unable to develop can be taken from these shoots and grafted in the spring, when the stocks are full of sap, and the buds have enough sap in them for the bark to be detached easily.

2°. Some make the bud grafts quite large (nine or ten *lignes* [see translator's note, p. 0053] long, three or four *lignes* wide); others make them barely two *lignes* wide & five or six long. The latter are easier to lift, and they are just as sure to be successful as are the larger ones. So the size doesn't matter much. Nevertheless, when bud grafts are made on stocks from which they come off easily, like the apricot tree onto an almond tree, a cherry tree on the small black fruit wild cherry tree, &c., it's an advantage to make the bud graft as large as possible, so that by covering & including a larger surface of the stock, its attachment will be more stable.

3°. When the graft is made on the current year's wood, & the sap is running well, the edges of the vertical incision can be opened only at the point where it intersects the horizontal one, & only enough to insert the point of the bud shield graft. Moving it downward will be enough to detach the bark. That way the viscous material won't be damaged at all, and the graft won't dislodge the bark any more than is necessary for it to be set;

two considerations that only can promote the attachment of the graft to the stock & guarantee the success of the operation.

4°. The ligature should begin at the point of the shield graft & wind upward until the incisions are completely covered. The turns should not be circular or spiral, but should criss-cross over the vertical incision & on the opposite side of the stock. If a wool or cotton cord is used, there's no concern that these materials will compress the graft too tightly. But hemp & osier bark don't stretch & lengthen at all, and care must be taken not to tighten them any more than is necessary to keep the graft securely on the stock & allow neither air nor rain to penetrate the space between them. A month or six weeks after the operation, it's necessary to inspect the grafts & to loosen ligatures that are too tight that easily can cause the bark of the stock to swell or thicken above & below the ligature.

It may be useful to include some other techniques of grafting that may seem easier to perform or more certain to succeed, or be more suitable for particular applications & in circumstances where the ones above can't be used.

IV. *APPROACH GRAFT.* This is a different kind of graft that is performed on two nearby trees or on ones that can be brought close to one another.

1°. *Figure 7.* A small vertical piece of bark is removed from one side of a branch *O* of a separate tree. A similar piece of bark is removed from one side of the stock *P*. The two exposed woody surfaces are brought in contact immediately, so that at least several points on the intermediate layer between the wood & the phloem of the graft & of the stock are juxtaposed.

All of it is secured by a ligature of woolen thread & coated with wax or with rich soil that's been moistened & pressed together. Setting of the graft on the stock is shown in *o*, *fig.* 9, & in *Y*, *fig.* 10. This graft, which often occurs naturally in the woods where branches are found grafted upon one another, is performed before or during the first run of sap.

It's not necessary to remove the bark; it's sufficient just to cut away the outer cortical layers & to bring the phloems in contact with each other. Woody fibers penetrate these phloems & join up at the point where they meet.

2°. *Figure 5.* On one side of a branch *C* of a separate tree, a long slanting cut is made, terminating at its upper end in a recessed indentation no deeper than half the diameter of the branch. A slanting cut same size as the slant on the graft is also made on the end of the stock *D.* The slanting surfaces are placed against one another as seen in *a*, *Fig.* 9, so that the phloem layers make contact in at least several places. The whole is secured & coated as in the preceding operation.

3°. *Figure 8.* I cut the end of the stock *V* in the shape of a wedge. On one side of a branch *T* of a separate tree, I cut a slit the same length from top to bottom as that of the wedge. I insert the wedge into the cleft, seeing to it that the intermediate layer between the bark & the wood of the stock matches up with that of the graft as in *e, Fig.* 9. I tie all of it up & coat it as above.

4°. *Figure 6.* A triangular notch is cut at the end of the stock *L*, the bottom of which extends no farther than the center of the stock & its height from eight *lignes* [see translator's note, p. 0053] to two inches, depending on the strength of the tree. One side of a branch *I* of a separate tree is cut in a triangular shape & in the right size to fill the notch cut in the stock. The two upper sides of its base end in recessed indentations. The one is inserted into

the other as in *n*, *Fig.* 9, taking care, as already mentioned, to position the insides of the barks in the same way. The entire graft is tied up & coated.

Methods three & four of this operation are easy to do only while the sap is not running, when the bark adheres to the wood.

This type of graft is more certain to be successful as long as the grafted branch draws its nourishment from its own base up to the point where it forms a union with its stock, because it's separated only after the union has taken place, i.e. it's cut off obliquely below the ligature & the cut covered with wax.

Quite large branches can be approach-grafted, & since they're not cut back at all, they develop into trees in a short time.

We've assumed that approach-grafted branches remain connected to their own tree until they've made a union with the stock. But they also can be separated from their tree, the large end planted at the base of the stock, & grafted near the other end, which then must be cut back to three or four buds above the insertion point. Such branches draw sustenance from the ground that aids & assures the success of the grafts. Sometimes the buried part even takes root at the same time that the grafted part adheres to the stock, & the same branch thus provides both a graft and a cutting. This operation can be performed only before the first run of sap.

The approach graft, despite the ease with which it's done, the certainty of its success, the advantage it offers for placing branches on the side of a tree that lacks them, as in *Fig.* 10, &c., is used almost only for propagating rare trees.

V. *GRAFTING BY FLUTE BUDDING (CHILD'S FLUTE, WHISTLE), Fig.* 11. Start with a smooth, well-rounded branch *H,* of the latest growth

and the same size as the stock *E* or as the branch of the stock on which it will be grafted. Near the end of this branch I make an incision in the bark all the way around, turning the branch under the blade of the pruning knife. Then, twisting the bark above the incision, I create a tube of bark *G* three or four finger-breadths long & having one, or at most two buds. After the stock has been topped, I strip off its end a tube of bark *F* of the same size, or a bit longer, that I discard, & I replace it with the tube *G.* I cover the junction of the barks and the end of the stock with wax or with molded earth to keep the rain from getting in between the graft & the stock. Further, if the bare part of the stock is longer than the bark put onto it, I split very small thin wood slivers around the end of the stock that I turn down like a parasol over the end of the graft.

Instead of removing a tube of bark from the stock, the bark can be slit vertically and peeled off in strips. After the graft has been set, it can be covered up with these strips, leaving the bud of the graft exposed, & the entire graft tied up. This is the preferred way to do it.

If the graft tube is too narrow, make a slit on the side opposite the bud & cover the break with a thin strip of bark from the stock. If it's too wide, slit it the same way & cut a vertical strip from it. In either case, the graft has to be tied on to keep it in direct contact with the woody surface of the stock.

This type of graft is practical for all sorts of trees as long as they're not gummy or resinous & that their wood is good and well rounded, but it's usually done only on fig & chestnut trees. Sap must be running fully in both the stock & the graft.

VI. *Fig.* 1. Instead of setting the cleft graft at the end of the stock or of its branches, it can be placed on the side

of the trunk to fill it out its branches, if none have emerged, or if they've died.

Graft *E* is trimmed to a wedge in which the end & the indents are cut obliquely with the result that each of the two surfaces somewhat resembles a lozenge.

A slit of length & depth corresponding to the wedge on the graft is made in the side of the stock *F*, or *G Fig.* 2, with a small chisel. The graft is set obliquely into the slit so that the indentations on the wedge cut make contact with the bark of the stock. It's then completely covered as with the cleft graft.

This kind of graft, one of the best, is almost infallible. It's performed at the same time as the ordinary cleft graft.

VI. *PUNCH GRAFT. Fig.* 4. The punch graft can be substituted for the bud shield graft. It's very easy to perform, it's expeditious & rarely fails.

Using a punch tool whose cutting edge resembles a rectangle eight or nine *lignes* [see translator's note, p. 0053] long & three or four lines *lignes* wide (or one resembling a lozenge or another shape of different dimensions), I cut out a piece of bark *S* with a bud on it from branch *RS*. I remove it like a bud shield graft making sure that the bud is intact.

With the same instrument I cut out a piece of bark *I* from stock *IK*. I detach it and discard it because it's useless *T*. In its place I apply the inside surface of piece *S* to the exposed woody surface of the stock. I cover it up, as with the bud graft, with several turns of hemp or wool thread that hide all the seams (*a*).

(*a*) Graft No. VI is also called a *Punch Graft* when, instead of inserting the graft into a cleft, it's inserted into a mortise made with a mortise-chisel, a common tool used by carpenters & lathe-workers.

This graft is performed during in the same seasons as the bud graft. It can serve to demonstrate the general principles of grafting from the standpoint of a gardener rather than of a scientist.

A tree grows only by adding new layers, cortical as well as woody ones. These layers form between the wood & the bark as though they were in a mold that shapes them and that holds & keeps the proper material for producing them. We can think of the outer woody surface of a tree as though it were the inner mold for a new layer, & the inner cortical surface as its outer mold.

If both of the molds, or just one of the two, is broken, the new layers stop growing over the injured part until it's scarred over with a new cortical sheet. This sheet emerges from the edges of the wound & spreads over the exposed region little by little to restore the mold. Furthermore, a tree whose bark has been badly damaged forgets about getting larger & is concerned only with restoring the integrity of its bark. Dress the wound with a plaster of earth, turpentine, or some other preparation of vegetable matter to protect it from contact with air & from drying out. It will heal up more quickly because the plaster in some way takes the place of the outer mold and helps & promotes the formation of a new layer of bark. But if you apply to this recent wound a completely fresh piece of bark from a similar tree that has the same dimensions as the wound, a thin cortical sheet will form between it and the wood of the tree. A similar sheet emerging from the edges of the wound between the tree's wood and bark will fuse together with it. The mold thus restored, the woody layers will continue to develop.

Let's now think of the operation on a stock

for setting a graft on it as though it were a wound or a break in the mold for new layers, & the graft itself as though it were a patch that restores the mold. But the repair won't take place if the new growths formed by the graft & the stock don't meet and join together. The new growths that emerge from between the wood & the bark won't meet if the outer woody surfaces & the inner cortical surfaces of the graft & the stock don't make contact on the same level and in the same direction and are continuous at least at one point. Nature is forgiving, easily satisfied, & the tree, eager to heal its wound, takes advantage of the least help offered to it. So this relationship, this matching up, this connection, is the most essential condition for the success of the graft. If it's fulfilled, the graft, if made of a branch, soon will produce a woody sheet of its own material between its bark & its wood; or if the graft is merely a piece of bark, between itself and the wood of the stock. Likewise, at the edges of the wound on the stock, a woody sheet emerges from between the wood & the bark that progresses toward the one from the graft. These growths, nothing more than slightly thickened sap, without any defined shape & consistency, join together where they meet. But the woody sheets can't spread beyond the edges of the bark without a cortical sheet that covers them & acts as an outer mold for them. This cortical sheet forms at the same time, spreads & joins up the same way, & then the graft begins to draw its sustenance from the stock. It's only through these new growths that the graft unites with the stock. The wood formed in the graft itself never joins with any part of the stock; it only supports the graft, or serves as an inner mold for its growth. After fulfilling this function, it dries up & dies. In the same way, the bark formed on the graft never unites with any part of the stock; it serves

as an outer mold for its growth and provides the material for its development. In the *Natural History of Trees*, I've dealt with grafting and its principles in greater detail. They can be summed up in two points: a relationship or similarity between the properties of the graft & the stock, and a relationship or connection between the same parts of the graft & of the stock. Fulfillment of these two conditions (the second one performed with a little skill at the proper time & in the proper way) assures the success of this horticultural procedure, as commendable as it is simple & easy.

CHAPTER I I.

Planting of Fruit Trees.

Article I. *On the Age & Size of the Plant.*

YOUNG trees raised, looked after, and grafted in a nursery as we've described, should be taken out as soon as they're ready to be permanently situated. This depends more on the strength of the stock than on that of the graft. All fruit trees can be planted (and peach trees ought to be planted) a year after grafting, i.e. fourteen to seventeen months after bud grafting & nine to eleven months after cleft grafting. This can be done provided that stocks of low-stemmed trees are at the stage of putting down roots of ten to twelve *lignes* [see translator's note, p. 0053] in diameter, or from thirty to thirty-six *lignes* in circumference; those of half-standard ones from fifteen to eighteen *lignes* in diameter, & those of standard ones from two to two-&-a-half inches in diameter or at least six inches in circumference; & from twelve to eighteen *lignes* in diameter for five or six feet of trunk. Whether this trunk develops from the stock

or from a shoot of the graft, in either case it must be left in the nursery long enough to gain the required strength. Trees that are to be planted around vineyards & estates, in open orchards, & in places frequented by cattle must be left to get even stronger, so that in a few years they will be in a secure condition.

Some gardeners believe that it's preferable to transplant weaker trees, because the less time that they stay in a nursery, the less accustomed they'll be to those conditions, the less their roots will acquire size and strength there, and their bark won't be as hard. As a result, they'll be less sensitive to a change in location, the damage to their roots won't be as great, the they'll have less trouble taking root again, and finally their success will be less faulty & incomplete. This practice sometimes succeeds, particularly when the trees are taken from nurseries very close to the area where they're to be planted, and they're lifted with great care & planted in the ground again as soon as possible so that the roots & the root system don't undergo any change. I know of a grove of over a hundred pear trees that were lifted from the nursery, possessing root origins barely seven to eight *lignes* [see translator's note, p. 0053] in diameter, transported more than six leagues [*Translator's note*: about fifteen miles] away, replanted three days after lifting, and that are succeeding very well in an area where stronger trees have failed. But I doubt that the small number of such examples should dictate against the usual practice of only planting trees of the sizes indicated above; I think of those transplanted when very small as though they were infants weaned too early that run a high risk of failing to thrive.

I've said that peach trees should be lifted from the nursery a year after grafting, regardless of the strength or weakness of the stocks on which they're grafted, because among all of the fruit trees, the peach tree is the one whose shoots take with greatest difficulty

on wood several years old. And the almond tree, the stock upon which the peach tree is usually grafted, with precautions taken to make it produce lateral roots, tolerates transplantation less well than other trees. So if some peach trees have to be left in the nursery for a second or a third year, or even longer, they must be pruned & the branches arranged as though they were already permanently in place. When they're to be lifted, a trench two spade widths wide & deeper than the lowest roots, must be dug at a distance of twenty-five to thirty inches around each tree, or even further, depending on the age & the strength of the tree. Uncover & free the roots little by little without damaging them. Cut the largest ones as far away as possible from their origins. Bring the tree to its intended destination as soon as it's been pulled up. Trim the ends of the roots and plant the tree according to the instructions that we'll give below. Tamp the soil down with water, groom the top, prune closely the branches to be preserved, and protect the tree from drought during the spring & summer. With this care, the tree assuredly not only will take root, but even will be able to bear some fruit in the very first year, despite having spent six or seven years in the nursery.

It's very useful to maintain a small preserve of fruit trees of all of the species that are managed this way, to replace both the trees that fail in the first year of a new planting as well as those that have died in older plantings.

The nurserymen's usual practice is to re-graft peach tree grafts that remain from the previous year, in other words to cut them back to four or five *lignes* [see translator's note, p. 0053] from their insertion point. Ordinarily, several new shoots emerge from the collar of the graft, and they save & prepare one or two of them. This practice is quite convenient for keeping grafted peach trees in a nursery for several years, where a shoot from the graft

would be only a year old & ready to produce new branches as a result. But experience has shown that such re-grafted grafts succeed poorly. A glance easily distinguishes them.

ARTICLE II. *On Preparing the Ground.*

THE LOCATION planned for each tree should be prepared several months before planting.

In vineyards, fields, orchards, &c, if the soil is good, holes of eighteen or twenty-two-&-a-half cubic feet are dug out, i.e. three linear feet in length, the same in width, & two-&-one-half or three feet in depth. If the dimensions are smaller, part of the plant is liable to fail; if larger, it would be beneficial but costly if a substantial grove is to be planted. The first earth taken out is piled on one side of the hole, & the earth from the bottom on the other side. If the soil is only of average quality, the holes must be widened, and the soil from the bottom discarded & substituted with sod or good topsoil taken from nearby ground or from somewhere else. The holes are left open until planting time.

When an orchard is planted repeatedly by staggered planting or otherwise, and the soil is only average, it's preferable to run the trenches the entire length of the rows of trees, three feet wide, two-&-one-half or three feet deep, & improve the soil as we've just said.

In the case of new espalier walls intended for planting, that are already built, plastered, coped, supplied with trellises, &c, as will be explained below, the beds are dug up six feet wide & about three feet deep. If the soil is good & its quality is suited to the kinds of trees

to be planted there, this preparation of the soil is sufficient. But if the ground is only average, or by nature unsuitable for the trees that are to occupy it, must be reclaimed & improved. Loose & sandy soil will break up & make more friable ground that is too compact. Cow manure, or still better heavy soil if it's available, will give consistency to soil that's too loose. If it's cold, compost beds, or better tree leaves, will warm it up. These additives are spread uniformly over the planting bed; & while it's being dug up, they're mixed in with the soil. But if the espalier previously had been occupied by trees of the same kind as those to be planted, fertilizers and simple additives are not sufficient. The planting bed has to be completely renewed with good, fresh soil brought in from elsewhere.

If bush-, fan-shaped, &c, trees are planted in new kitchen gardens where the soil is good (as I assume it is), well dug up & prepared, the trees will succeed well there, as long as their species & the quality of the soil are compatible. But if the bed of a former kitchen garden has to be renewed, the same must be done as for the espaliers: change the soil or change the type of tree, replacing trees that have fruit with seeds with trees that have fruit with pits, or the reverse. Similarly, when a tree is planted in a place previously occupied for several years by another tree of the same kind, a hole must be dug that is two or three feet deep with an opening of thirty-six square feet, i.e. six by six feet. Strew the soil taken from it over the nearby ground, & fill it with good fresh soil.

I think it's superfluous to warn that if stones, gravelly or pebbly veins &c, are found while digging holes, trenches, or turning up the soil, this material must be removed & substituted with good soil.

It's also known that ground where the good soil is only eighteen to twenty-four inches deep, only can accommodate cherry & plum trees, or trees grafted on them as stocks. This is because plum & cherry tree roots run close to the surface of the ground, & don't penetrate at all. Other fruit trees require about three feet of good soil. So if the depth is insufficient in the area where planting is intended, it must be remedied accordingly.

If there's a lot of barren sand, pebbles, or other material that allow water to penetrate underneath the layer of good topsoil, a sufficient amount of this material must be removed and replaced with enough fresh soil as is necessary to achieve, together with the layer of good soil, a depth of about three feet. Keep in mind that turned & dug up soil loses about a fifth of its volume as it settles down & compacts. So the total new depth should be three-&-a-half to four feet.

But if the layer of good soil covers a bed of clay, loam, tuff, or other material that retains water, this bed must not be breached nor dug into, because water that accumulates in holes or recesses that have been dug into it will become tainted and will putrefy the ground, the contamination will spread to the roots of the trees, and they'll soon be lost irretrievably. The best course to follow is to raise the level of the ground with fresh earth brought in from elsewhere and to mix it with the layer of good soil, digging it up only as far down as the bed of tuff or loam which is left intact. This leaves a depth of at least three feet of good soil, since the part close to the tuff or to the loam is always cold and has an adverse effect on trees.

Planting in these types of soils can be very costly. It would be no less so

if there's a quarry beneath an ordinary depth of topsoil with crevices that allow water to run out. Holes or trenches at least six feet wide by three feet deep would have to be dug there & filled in with good soil. It's not even certain that the trees whose entire livelihood will be limited & confined within this space, unable to live frugally, won't be wanting and destitute before their old age.

On the day, or several days, just before planting, small holes about eighteen inches wide and a foot deep are made in espalier beds & in turned up ground. The holes and trenches are filled to within half a foot of the surface of the ground. The tree roots thus will be half a foot below the surface of the ground, & when all the soil that previously had been removed is replaced in the holes and trenches, the tree will be earthed up about half a foot. But after tamping down, the soil will settle half a foot, lowering the roots by the same amount. The final result is that the tree will be planted about a foot deep.

In turned up ground, trees first are planted a foot deep, because no matter how much the earth settles as it firms up, the tree roots always will remain just about the same distance from the surface of the ground, i.e. about a foot below it, which is a suitable depth for most trees. In this connection a couple of things deserve mention: 1°. the insertion point of a graft should be entirely above ground, otherwise roots would soon emerge from the thickening at the graft union, & the tree, growing independently of its base, will become branchy & will bear fruit with difficulty. This mishap occurs especially with trees grafted on quince, Doucin, & Paradise. Entirely the opposite happens to pear & apple trees grafted on stocks of their own kind & planted in loose soil. It's because

this layer, or upper level of the roots, normally the most vigorous, sometimes dries out. The tree draws little sustenance from the lower roots, already impaired and weakened by the ones above. Instead of producing too many branches, it deteriorates. 2°. The roots may be a little deeper than they had been in the nursery. If they're too deep, they'll die. The tree, needing to generate more of them at a suitable level for it higher up, will decline for a long time during this phase, & it often succumbs. Most trees that are raised in one place have roots that develop flush with the ground, some of them even above the ground. This shows that it's preferable to plant them a bit higher, except for earthing them up during the first years. Keep in mind, however, that in loose soil they should be planted farther down than in firm soil, especially if it's not very deep.

ARTICLE III. *On Distances between Trees.*

The distances apart that trees should be planted depend on the properties of the soil, the species of trees, their size, & the strength that they need to attain. 1°. Pear, apple, and cherry trees in an orchard with average soil will be sufficiently separated if they are eighteen feet apart. Plum and apricot trees &c. can be a little bit closer. So an arpent of nine hundred square fathoms will hold about a hundred trees. But if the ground is of good quality & one wishes to cultivate it as well as to use it for something else, then leave twenty-four feet between each tree. 2°. On an espalier with good soil where there are eight feet or less of wall below the coping, only dwarfs of peach, apricot, and pear trees on their own stocks can be planted, from fifteen to eighteen feet apart. Pear trees on quince stocks

& other trees, from twelve to fifteen feet; the latter from ten to twelve, the former from twelve to fifteen feet. If the wall is nine to ten feet high, a half-standard tree from four to four-&-a-half feet high is planted between each dwarf tree. It's pruned a little at a time as the dwarfs grow out & cut back if by the February pruning it doesn't leave fifteen to eighteen inches for them to put out their new shoots. But the half-standard trees can live quite a long time to compensate for the space that they've occupied. If the walls are ten feet high or more, standard trees of five-&-a-half to six feet are planted between the low-stemmed trees. 3°. Bush trees, those on counter-espaliers, in fan training, palisaded, &c. around kitchen garden plots are planted at the same intervals as low-stemmed trees on espaliers, & an apple tree on a Paradise stock can be planted in between them.

Appearance requires that in a planting all standard trees are be of the same height up to where their branches begin, whether they're in the open or on espalier, & the same goes for half-standard trees. Never plant one species & its varieties together at random; rather all trees of the same species are placed on the same espalier or in the same row, & the varieties are arranged according to the time that they mature. This is a consideration that, beyond the neatness that it gives to a planting, has real advantages as much for raising the trees & harvesting the fruit as it does for renewing the planting when the crops have to be rotated and one wants to be spared having to change the soil.

ARTICLE IV. *On the Time & Method for Transplanting Trees.*

THE PLANTING SEASON is from mid-October up to March; or rather for the full time that the sap in the trees is

not running, since almond trees sometimes bloom as early as the beginning of February, & apricot trees follow soon afterwards. Generally, it's more advantageous to plant in autumn than it is toward spring. That's when the healthier and more suitable soil for this kind of work is found. Winter rains tamp down the soil & make it adhere it to the roots, which doesn't allow for work during that season. From the moment of the first run of sap the tree is completely prepared to thrive & ready to prove that it can take root again & succeed.

For transplanting, dull, overcast, slightly damp, calm & mild weather is preferable to bright sunshine, dry heat, & especially frost. The roots thus are less exposed to the effects of cold and to drying out.

Roots must be uncovered carefully without damaging them. They should be freed & pulled up with the same care, so that they can be lifted as lengthy & as intact as possible & their root system preserved. The tree is pulled on & uprooted when it only offers moderate resistance, and there no longer is any large root that holds it down. If the trees in the nursery have been spaced apart as I've indicated, there will be enough room & latitude to lift them properly. They are brought to their destination without shaking loose the earth that ordinarily adheres to the root system. If the trees are not to be transported right away, it's very beneficial to cover the roots with hay or with damp straw.

Before putting the tree in its permanent location, the roots are dressed, i.e. their ends & root tips trimmed, as long as they're not damaged or dried out. Otherwise they have to be cut off. Roots that have been bent, stripped, broken, or damaged, are cut off behind the injured spot. The cut must be clean, slanted, or in an elongated fork, with its surface against the ground when the tree is in place.

The top of the tree likewise must be trimmed. If care has been taken to pinch off shoots from the graft, it will be have a number of the right branches to guarantee that the tree has the proper shape. For trees in the open & for bushes, two, three, or four of the strongest & best located ones are saved and are pruned back to the third bud. For espalier, counter-espalier, or fan-trained trees, one or two on each side of the tree parallel to the espalier wall, or in a suitable direction, are saved for pruning back to three buds in mid-February. The all-too-common practice of many gardeners, based on their ridiculous rule, is to disfigure the top & the roots of a tree when planting it. They destroy just what they desire on a tree, the fine top & good roots; they'll only reject it in the end because those are what are missing.

A planter sets the tree in the hole; with one hand he firmly supports it in the position & at the depth where it ought to stay, & with the other he arranges the roots & supplies them with loose soil tossed there by another gardener. He agitates the tree vertically a little so that it settles uniformly & no empty space remains. When the roots have been well supplied with earth & covered up, he tamps down the earth with his foot, gently stepping on it all around the tree, assuming that the soil is not so moist that it gets pressed together. The hole is filled completely, & the ground is tidied up to his satisfaction. It's even better to tamp down the soil with water than by foot, i.e. using a watering can with a pump, to sprinkle one or two pails of water on the roots that have been supplied and covered with friable soil. The hole is not completely filled until the following day or a few days thereafter, so that the weight of earth tossed on top of the wet soil doesn't turn it to mortar.

When the tree is set in the hole, several things deserve attention. If it's an espalier tree, 1°. it must be planted six or seven inches from the wall, & the trunk inclined slightly toward the wall. 2°. Avoid pointing the main roots in the direction of the wall;

& if there are two large ones opposite one another, place them parallel to the wall. 3°. Lateral branches that will be saved to establish the shape of the tree are oriented in the same direction. 4°. If the graft curves upward from its origin, turn the curvature opposite the wall, or away from it, but not to one side & parallel to the wall. 5°. Turn the graft outward from the wall, & the incision in the stock that is still uncovered toward the wall. If all of these conditions can't be met, sacrifice the least important in favor of the essential ones, namely the direction of the branches & roots. For other trees, the strongest roots must be directed toward the best soil. Set the trunks well upright and further tamp down the earth to keep the trees from being dislodged or upended by the wind. If they're planted in open ground, equip them with points & with three or four firmly embedded stakes that extend four or five feet out of the ground. All of it is secured around the trunk with good osiers or briers.

ARTICLE V. *On Trees Grown on Location.*

Up to this point I've assumed that trees raised in a particular nursery are given life and develop under the eye of the proprietor who follows their progress. He makes sure of the stocks & of the species from which the grafts were derived, their correspondence with one another, the quality of the soil in his nursery & of the soil where the young trees are transplanted. He himself sees to it that they are lifted & replanted carefully, guaranteeing that his plantings are completely successful and satisfying. But my assumption is confirmed only rarely & among but a small number of experts who are truly interested in getting the fullest, most beautiful & most delicious kinds of fruit.

The procedure suggested by M. de Combes in his excellent

Treatise on the Cultivation of Peach Trees, & that also is useful for all kinds of fruit trees, will find even fewer supporters. Prepare the ground, adjust the distances between the trees, and in November plant at each assigned spot three pits, of the kind of stocks that only grow from seeds, nine or ten inches apart. (They can be germinated in sand & put in the ground in the spring without cutting off the taproot). As for stocks grown from cuttings, plant three cuttings in each assigned spot in the same season & at the same distances apart. (Three pits or three cuttings are put in each place to make certain of getting a good stock). Treat these stocks as we've explained in the article *On Nurseries* and graft them when they've acquired the necessary strength. Pinch off the shoot from the graft and train & space the lateral branches that develop from it in an orderly fashion. At each spot leave only the best of the young trees & pull up or destroy the others without disturbing the ones that remain, &c. I won't detail the advantages of this procedure - they are set forth in the above work. They will be easy to detect following what we've just said & what we still have to say. I'll simply add that I even know of nurserymen who don't take any plants into their own nurseries to fill out their espaliers, but raise the trees right there on the spot. But don't expect them to encourage the use of this method that in any case isn't without its problems.

In fact, the ground is much dryer in espaliers than it is in a nursery where shade from the plantings keeps it cooler. Stocks in espaliers have almost no second run of sap, if care hasn't been taken to water them to make up for lack rain during the season. Furthermore, under the constant heat of the sun, the run of sap is very substantial while it persists. But it stops suddenly, not subsiding gradually at all. As a result, there's barely a moment, so to speak,

for grafting the stocks, & a gardener otherwise occupied will miss it. Yet sometimes September rains bring on a substantial resumption of sap that ruins bud grafts. I've noticed this only after the fact, having watched grafts on espalier stocks fail for three years in a row from any one of these causes: an excess, a shortage, or the resumption of sap. Care & the watchful eye of the owner are required to achieve all the desired success in this practice. I've merely summarized it & I do recommend it cautiously because the small amount of care that goes into it & a concern about delay are soon compensated for by the rapid progress, vigor, and well-proportioned shape &c. of a tree raised on location. It may seem to most people like a new approach that takes a lot of time, care, & trouble to accomplish the same result that can be achieved easily and quickly by going to the commercial nurseries.

So those who prefer to & those who have to resort to the commercial nurseries should 1°. avoid nurseries with rich, moist, or manured & fertilized soil. 2°. pick out the trees you need early so that you're not stuck with only the rejects. 3°. Furthermore, refuse trees that are weak, crooked, stunted, cut back, moss-covered or damaged by animal bites, grafts that are re-grafted, bent at their origins, or with vigorous shoots & buds that are flat & far apart indicating that they had been taken from suckers. Also those that are greatly swollen at the insertion point & whose shoot is much bigger than the stock; those that appear to be poorly attached or afflicted with resin or canker; and those that are not supplied with good buds that are likely to yield attractive new branches. Reject as well all badly pulled-up trees

whose large roots aren't at least six inches long, without injuries, cankers, or breaks; and those whose medium roots aren't well preserved, & whose trunks aren't straight and very sound.

4°. On the contrary, choose trees that are attractive and not too strong, with bark that is vital, clear, healthy and smooth, with signs of youth & vigor, and with all of the qualities opposite to those just mentioned above.

5°. Moreover, don't be misled about species and varieties. But how can you be certain of them? When the trees are taken from the nursery, they have no flowers, leaves, nor fruit. The habit, shoots, & buds are enough to distinguish one species from another, e.g. a pear tree from a cherry tree. But in some species these features don't distinguish among any of the varieties, and in others they allow you to guess about some of the varieties instead of identifying them with certainty. It requires a lot of care and practice with trees to get much help from these characteristics. The registry or inventory that some nurserymen can provide is evidence that they are able to keep orderly nurseries, but it's only a presumption that they've actually done it, & that the nurseries really are in conformity with & relate to the registry.

6°. The pippin is a variety of apple tree, the *Dauphine* a variety of plum tree, the morello a variety of cherry tree, the large *Mignonne* a variety of peach tree. I suppose that these varieties can be distinguished clearly by their shoots & their buds; but they have sub-varieties as well, some of which are authentic, independent, & very noteworthy; others are degenerate & quite inferior. Can they be distinguished equally well? We can add that the fertility of trees often depends on the branches from which the grafts were taken, and that some of them succeed well only on certain stocks. Who can count on the nurseryman's care in making these choices & his judgment for all these things?

I don't make any further case or urge any other precaution other than to leave it to the ability & good faith of the nurseryman who appears to have the best of these qualities, & for whom it is just as important not to mislead the customer as it is for the customer not to be misled.

7°. As the trees are lifted, label them, and tie them into bundles of eight, twelve, or eighteen, according to size. Arrange the roots & interlace them with one another. Cover it all up with a lot of straw tied with wicker to keep the roots from drying out & the trees from being damaged in transport.

8°. If the transport will take a very long time, cover all of the roots with wet moss, place a length of straw on top of them, cover it all up with packing cloth, a reed mat, &c., tie it up well & secure it with twine. Similarly supply and cover the trunks with a lot of straw. To reduce the volume, grafts can be cut back to two or three inches shorter than they will be when the trees are set in place, & remove from the top most of the branches that have to be cut off. Protect the trees from frost during transport, & every five or six days dip the ends of the bundles containing the roots into water, or sprinkle some on them to maintain their moisture. Low-stemmed trees can be transported more securely in cases or baskets well supplied with straw, or better with wet moss that doesn't mildew & stays damp for a long time.

9°. If the journey hasn't been longer than three or four days, their roots of the trees must be soaked in water for several hours on arrival. Trim them, remove all the root hair, and plant them the way we've described above. Cut back the graft to five to seven inches above the insertion point, with the hope that branches of the desired quality will grow out in the right direction. If the journey had been a long one, the roots are left to soak for two or three twenty-four hour periods. If in the end

the trees are not planted until long after they arrive, a trench must be dug eighteen to twenty-four inches wide by about a foot deep. Set the trees in it separately, one next to the other. Fill it and cover the roots with earth, as though they were being planted permanently. They'll be secure that way, & planting can be put off until March.

Nota. If the trees have to be planted shortly after they arrive, it's preferable to leave them outside & to cover them with litter to protect them against heat & frost, rather than to put them inside a building. Tree roots must be put in water only when they can be planted right after they've soaked for the required time. If severe frost interferes with keeping in the ground those trees that can't be planted until long after they arrive, they can be put in compost of old manure.

In spite of the care taken in the choice, supervision, & planting of trees, some often will die during the first few years from mishaps, from unknown causes, from some unnoticed defect, and the greatest number from drought. I know of no remedies for unknown ills, but precautions can be taken against drought. 1°. It's very useful to fasten a batten or a lath of slate to the trunks of standard or half-standard trees, whether in the open or espaliered, to protect them against the effects of the sun, or to wrap them in long straw from the base of the tree up to the beginning of the branches. In warm, sandy, or dry ground, & in heavy and clayey soil that's subject to cracking & splitting, it's necessary during the quite common dry spells of spring & summer to pour two or three pailfuls of water at the foot of each tree every eight or ten days. Hoe the wet soil a few hours later & cover it with straw litter or with ferns.

It would be better to remove a few inches of earth extending two or two-&-a-half feet from both sides of the base of the tree, replace it with a layer of straw litter or ferns three or four inches thick, water it with two or three pailfuls of water, and toss the earth back on top of it. If the length of the dry spell requires repeated waterings, the earth must be removed before each new watering & replaced afterwards, so that it will remain dry & friable and won't crack and allow sunlight in. This kind of help can be given to the trees while they're being planted. It will be needed from time to time in this type of terrain beyond the first few years after planting. It would be superfluous & perhaps even harmful in fresh or moist soil.

It's not unusual for newly planted trees, especially those that take root slowly & languish, to be attacked by vine grubs & other insects that devour the buds & the bark around wounds. This debilitates the trees & often kills them. Look for them behind trellises or at the bases of the trees under small clumps of earth, or catch them in the act around sunrise & sunset, and destroy them. Grafts can be protected by covering them with well closed paper cornets.

CHAPTER III.

ON ESPALIERS.

ARTICLE I. *On Exposures.*

THE EXPOSURE for planting a tree is decided to some extent by how readily its fruit develops the ripeness & color that it needs to be considered in good condition. Some trees succeed only with a southern exposure. An eastern or western exposure is sufficient for most. Some are content with a northern one. I never believe that the western & eastern ones are the same - the latter is much better; in warm & loose soil it's often even preferable to a southern exposure. Under the cultivation of each individual tree, we'll indicate the appropriate exposure for it. We just note here that the terms "southern, "northern", &c. for exposures should not be taken rigorously. An espalier angled from the south toward the east or toward the west is about as effective as if it faced due south because the sun shines on it for the same amount of time. And an espalier angled from the east or from the west toward the south is better off than one facing due east or due west because it enjoys a longer time in the sun. The same holds true for an espalier angled from the north toward the east or toward the west.

ARTICLE II. *On Walls.*

I. NO espalier exists without a wall or other mainstay to support the trees, to protect them from ill winds,

& to reflect the warmth of the sun onto their fruit to promote & improve their ripening. I specify ripeness, not quality, because the flavor of bush tree fruit is preferable to that of espalier trees, & the fruit of trees grown in the open is superior to that of all of the others. The advantage of espaliers lies in more reliable production of fruit, those that are larger, ripen earlier, & have better color. Every country has its own material for wall construction. 1°. Here walls are made of pebbles & plaster debris cemented & covered over with plaster. But old plaster absorbs a lot of moisture; it expands, swells, & cracks the overlay of new plaster and provides a haven for insects. These walls may be cheap, but they offer neither good quality nor lasting service. 2°. Elsewhere, soft ashlars are used, but rough plaster coating gives the same effect. The only advantage these walls have over the others is that they last a little longer. 3°. Very good walls are made from hard ashlar, millstone, even sandstone (though it holds rough plaster & coating poorly), as long as the mortar is not of lime & cement, & any kind of hard stone with plaster or with mortar of lime & sand, or even free soil. The visible stones first are rough coated with plaster, or preferably with mortar of lime and coarse sand. Eight to fifteen days later, when the coating is thoroughly dry, it's coated again lightly with the same material. 4°. Walls of well baked & well conditioned bricks are the best and the most durable. Some of these now are beginning to appear in France; those who've spent the money for them haven't regretted it.

In locations where these materials are entirely lacking, putting up espaliers needn't be a problem. 5°. Some construct walls made out of pebbles held together with pugging mortar. This is a kind of mortar made of rich earth, straw, & chopped hay. When the walls are thoroughly coped & coated with mortar of lime

& coarse sand, they'll last a long time. 6°. Others construct studworks filled in with pugging mortar, but these don't last very long, & the pugging mortar separates from the wood leaving holes where insects can hide. 7°. A fence made entirely of boards would be better, but it would be expensive & won't last long, even when oil-painted. 8°. Walls of dry stones, i.e. without mortar & without coating, are the worst of all. They shelter and protect trees poorly because they provide a haven for pests to hide & multiply in safety.

Walls are built from a minimum of seven feet high up to a maximum of fifteen feet. When the wall is four to six inches above the surface of the ground, it's a good idea to place at that point an inch-&-a-half or two inch offset on which to set the ends of the vertical slats of a trellis.

I I. A coping is necessary to protect the walls, their coatings, & trellises, that otherwise soon would be deteriorated & ruined by rain. The coping should project at least four inches; it can be fashioned in different ways & from different materials.

1°. Putting the stones together without mortar, even though they overlap, will result in a structure that's of little use & hardly sturdy.

2°. In regions that have flat stones of slate or schist large enough to cover the whole thickness of the wall & project as necessary, two overlapping rows of these stones make a suitable & durable coping.

3°. The most common copings, ones that can last in good condition for nine or ten years & sometimes longer, are made of flat & hard ashlars overlapped with other ones of the same quality. The whole is set with plaster or with a good mortar of lime, sand, & cement.

4°. Very good copings are made with two rows of tiles

arranged as eaves. If a row of slate slabs is added, the job will be even more expensive but tidier & longer lasting. It's covered with ridge tiles & it's all set with plaster or with a mortar of lime, sand, & cement. Since ridge tiles are expensive, the eaves usually aren't covered with tiles but rather with hard ashlars fastened together tightly and rough plastered.

5°. The coping will be just as good & neater if made as a small cover of tiles or slate whose ridge or final rows are covered not with ridge tiles but with a network of plaster or of mortar of lime & coarse sand.

6°. An inexpensive coping made from thatch covered with earth will last a long time without repairs. It's not attractive to look at, & sometimes heavy rains wash a bit of soil onto the trees. But this doesn't happen very often, & it affects neither the trees nor their fruit. So this coping will prove useful in the absence of a neater one.

7°. Freestones with one face equal to the thickness of the wall plus its projections, & the rest cut like a tablet, a prism, or convex on the top, make the nicest looking & the best copings. But they require sturdy walls to support them and very rich owners to pay for them.

ARTICLE III. *On Trellises.*

THE BRANCHES of espalier trees need to be trained in the proper position & orientation to get the trees' desired benefits & shape. This requires sturdy trellises for fastening them or other means of holding them in place.

I. Some of the various expedients available to gardeners

are unattractive. The frequent renovation of others does a lot of damage to buds & branches. And others only manage to train the trees crudely, irregularly, & unstably. Similarly, bone, pegs, nails driven into or fastened on a wall, rods, &c., aren't good substitutes for a trellis.

I I. I have a much higher regard for *loquettes* (these are small strips of cloth that hold the branch & are fastened to the wall with small nails). But they're no use on a wall of brick or hard stone, unless it's coated with plaster an inch thick. Although the cost of the cloth & nails is not a major concern, the same can't be said for the time needed to train a tree with *loquettes,* which is at least double that required to train it on a trellis. I should add that a large branch whose orientation one wants to change can't be held with a *loquette,* so to this extent the method is not equivalent to using a trellis.

I I I. Some fashion a kind of trellis with heavy iron wire. First they fasten on the wall, with nails or with iron hooks, three lengths of sturdy, oil-painted props of heartwood of oak, parallel to the coping. One is placed under the coping, another at the base of the wall, & the third halfway up the wall. Onto these three horizontal rows of props, other similar ones are fastened every six feet with iron wire, intersecting them at right angles & dropping vertically. They then stretch iron wires from one end of the wall to the other and fasten them to the vertical props with nails. Similar iron wires are stretched vertically and likewise fastened with nails onto the three horizontal lengths of props. The lengths of iron wire, both horizontal and vertical, are placed nine to twelve inches apart. Finally, the lengths of heavy iron wire are tied together with brass or with thin, annealed iron wire

at every point that they intersect. Such a trellis lasts a long time, it offers no haven for insects, & doesn't let dormice walk easily onto the espaliers. But it's not without its faults. Osiers slide along the iron wire, and branches, especially the large ones, can't be kept in the right places. Iron wires aren't able to maintain sufficient tension for the structure's stability, the trees are easily shaken by the wind, & lots of branches become damaged by rubbing against the iron wire. Even though I've seen extremely fine espaliers constructed with iron wire, such a trellis won't bear comparison with the one we're about to describe, neither in terms of its usefulness nor even its economy.

IV. Strictly speaking, a trellis, & the only kind that can hope to give complete satisfaction, is made out of props or laths of heartwood of oak, or of chestnut poles, split & planed. They're usually found in lumberyards around Paris. In the provinces they can be made by lath & hoop workers who know how to split & plane wood. As soon as the wood is split & planed, it's tied tightly in bundles in the middle and at both ends to keep the laths from warping. A commercial bale of trellis slats is two hundred and twenty-five feet long, so the number of shoots that it contains depends on their length. A commercial bundle consists of twenty-five shoots nine feet long. Three bundles of twenty-five shoots three feet long, or two bundles of twenty-eight shoots four feet long, &c. are equivalent to one commercial bundle. It's unnecessary to point out that wood that is oily, knotty, gnarled, or gnawed by animals can't be used for this purpose. The laths are given as much length as possible so that fewer assemblies have to be made.

They're usually fourteen to fifteen *lignes* [see translator's note, p. 0053] wide by nine or ten thick. In several community gardens, that offer some lessons in economy, I've seen trellises made of props eighteen *lignes* wide by fifteen *lignes* thick.

If the props had been made up a long time before they're put to use & are very dry, they're soaked in water for several days. They're then made ready, i.e. uneven spots are planed, the warped ones are straightened out, and the ends of the shoots that need to be joined or assembled are chamfered or beveled. To straighten a bent portion of a prop, the concave side is laid upon a sawhorse or on a block. The convex side is struck obliquely with a billhook, penetrating about a third of the width of the prop. It's turned on the cut convex side & passed under a brace or an iron pivot fastened on the edge of the block or sawhorse. It's positioned so that the notch is between the brace & the hand moving it. One presses down carefully on the prop to the point where a small sound made by the breaking wood fibers is heard & the bent part straightens out. But the cost is a prop that to a large degree is broken & considerably weakened by this operation that has to be performed everywhere that the prop is bent. For this reason, at the time that the laths are being soaked, it's much better to warm the bent portions over a fire of wood shavings & to cramp them under an iron support. This straightens them easily & almost without any break.

The wall to be covered with a trellis should have iron hooks on it. Two kinds of hooks are used. One type is about six inches long, four to five *lignes* [see translator's note, p. 0053] wide, a *ligne*-&-a-half thick, and split at the end to form a fixture where it will be inserted into the wall. The other end is bent into a right angle where it forms a hook an inch or an inch-&-a-half long.

Holes are made in the wall with a cold chisel or with the point of a hammer. The hooks are fastened into them with plaster & small tile shards, or with mortar of lime & sand, as long as there's enough time for it to dry out well. The other type of hook is no longer than four to five inches, round or square, shaped like a large tenterhook, and pointed on the end that is inserted into the wall. Large pegs of oak or other durable wood are forced between the stones, & the hooks are driven in at those points. While attaching the hooks or driving them in, a piece of wood a little thicker than the trellis laths is placed between their curved part & the wall to ensure that the laths that are to rest on the hooks will go on them easily.

Supporting a trellis requires several rows of hooks parallel to the coping. Three rows are sufficient on a wall of six to nine feet below the coping; four rows are needed on a wall of ten to twelve feet. The hooks in the same row are placed three feet apart. The space between the rows varies according to the height of the wall. The first row of hooks is placed under the next-to-the-top lattice squares, the last row underneath the last or next-to-last lattice squares from the bottom. The other row or rows should be spaced equally between the top & bottom rows.

Suppose that one wants the lattice spaces of the trellis to be nine by eight inches, including the widths of the laths, i.e. that the horizontal laths are spaced at nine inch intervals & the vertical ones every eight-inches – a suitable proportion for the stability of the trellis & for training the trees properly. A vertical line is drawn from the top of the wall to the base with a plumb-line or by other means. Eleven inches below the coping, a point is marked on the line where the first row of hooks

as well as the next-to-the top lattice squares of the trellis, will go. The rest of the line down to the foot of the wall is divided into equal lengths of nine inches each; the other rows of hooks will go on these division points where appropriate. Similar vertical lines are drawn on the wall at intervals and divided the same way.

If the lattice spaces are of the size suggested above, the first row of hooks on the wall, regardless of their height above the ground, will be eleven inches below the coping.

As to the rest of the rows, on a six-foot wall the second row will be three feet two inches below the coping, & the third row five feet five inches.

On a wall seven to eight feet high, the second row will be at three feet eleven inches, & the third at six feet, eleven inches.

On a nine-foot wall, the second row will be at four feet eight inches, & the third at eight feet five inches.

On a ten-to-eleven-foot wall, the second row will be at three feet eleven inches, the third at six feet eleven inches, and the fourth at nine feet eleven inches.

On a twelve-foot wall, the second row will be at four feet eight inches, the third at eight feet five inches, & the fourth at eleven feet five inches.

Different means can be used to position all the hooks in the same row exactly evenly. Some people dip a cord into a black dye made of burnt straw & water and stretch it from one point to the next, marking lines on the wall as pit-sawyers do on their pieces of timber. Others drive nails or pegs in at the specified points and lay on top of them a cord or mason's line fully stretched by weights at both ends. Yet others cut laths to a length equal to the distance from the coping to the row of hooks;

by fitting one end under the coping & placing the hook against the other end, they simultaneously adjust the projection of the hook from the wall & its distance from the coping. When some of the hooks in the row are positioned properly, it's usually sufficient to align the rest of them by eye.

Nota 1°. The hooks should be staggered; i.e. each hook in a row should be at the mid-point relative to two hooks in another row.

Nota 2°. On walls only six to eight feet high, where the rows of hooks aren't far apart, hooks in the same row can be placed four feet apart from one another, instead of three feet.

A series of horizontal laths is set on each row of hooks and secured by binding them with annealed iron wire. The beveled edges of the laths are fitted to one another, joined together, & tied with two or three links.

On the rows of laths closest to & farthest from the coping, divisions eight inches apart (i.e. the distance from one vertical lath to the next) are marked with chalk or blackened stone. Initially vertical laths or uprights are placed on every sixth division and are attached to the horizontals. Then the rest of the horizontal laths are run between the wall & these uprights in between the rows of hooks. They're tied onto the uprights nine inches apart corresponding to the divisions marked on the wall, and they're joined and assembled. Finally, the rest of the uprights are put in place, & the vertical & horizontal laths are tied together everywhere that they intersect.

A trellis can be constructed in a more mechanical way without having to mark any divisions on the wall or on the laths. One takes a small board about ten inches long

by three or four inches wide and four to five *lignes* [see translator's note, p. 0053] thick. Assume that the lattice spaces in the trellis are nine by eight inches, & that the laths are fourteen *lignes* wide. 1°. A very conspicuous mark is made at a point nine inches along one edge of the board. Then, subtracting a length of fourteen *lignes* from this length of nine inches, or alternatively, starting at the beginning of the board and measuring seven inches ten *lignes* back up toward the mark, another very conspicuous mark, or even an indentation, is made. These two marks determine the long side of the lattice spaces or rectangles in the trellis: one of the marks includes the width of the lath; the other excludes it. 2°. Along the other edge of the board, two conspicuous marks are made at eight inches & at six inches ten *lignes* that determine the short side of the lattice space or the distance from one vertical lath to the next.

When the series of laths have been positioned on the hooks supporting them, the first vertical lath is put on & attached to them. Then, setting the end of the board against the inside edge of this lath, the next one is placed so that its edges line up with the two marks on the side of the board indicating the shorter intervals, i.e. six inches ten *lignes* & eight inches, or at least so that its outer edge is on the eight inch mark. The other vertical laths are positioned the same way. At every stage a plumb line is dropped to make sure that they're vertical, in case they'd been dislodged. As one goes along, the horizontal laths are passed between the uprights & the wall. They're connected and positioned at the appropriate distances using the side of the board marked with the longer distances, & the lattice squares are tied up with iron wire as described above.

A trellis also can be constructed in other locations, against the wall of a building or elsewhere, in sections two or three toises [see translator's note, p.0085] long. It's readily understood that the hooks on which

the trellis sections are mounted should be positioned at the same distances & in the same arrangement as those on an espalier wall. The iron wire bindings should cross, some from right to left, the others from left to right, so that during transport the lattice squares won't slip into diamond shapes. Finally, care must be taken during assembly of the trellis panels on location that the lattice spaces at the connections are kept the same size as the others.

Holding annealed iron wire in the left hand, the laths are grasped and tied diagonally at their intersections in order to bind the lattice squares & hold them fast. The wire is crossed over, or a half turn is made. Then, gripping it with a pair of non-cutting pliers held in the right hand, it's pulled toward oneself so that the laths are tightened properly and the two ends of the wire are twisted around each other two or three times. Finally, still gripping it tightly, after four or five swift & vigorous quarter-turns back & forth, or circular movements to the right and left, the iron wire will break off in the pliers. With a few hours practice, a trellis-maker can become adept at this little maneuver. A cutting pliers can be substituted if this skill is lacking.

To anneal iron wire, it's rubbed with tallow & buried in live coals from a furnace. Or, without tallow rubbed on it, it's tossed into the fire & left there an amount of time depending on its size. An iron wire half a *ligne* [see translator's note, p. 0053] in diameter should remain there eighteen minutes. Usually this thickness of iron wire or slightly less is used for this purpose.

Once the trellis is finished, it's painted with two or three coats of paint well ground up in second press walnut oil, or better yet in linseed oil which has more substance. For the first coat, litharge or oil of lavender is mixed in to hasten drying.

A new coat should not be put on until the preceding one has thoroughly dried. Strong sunlight & rain aren't suitable for this job. When the laths are ready, it's better first to paint them with two coats before using them, & to put on the third coat when the trellis is finished. Once they're painted on all four surfaces, they'll resist the harmful effects of exposure to air for a longer time.

CHAPTER I V.

ON PRUNING FRUIT TREES.

ARTICLE I. *On Times for Pruning.*

THE two purposes in pruning fruit trees are their beauty and their fecundity. The latter depends on flower buds & the former on branch buds. If a clear distinction isn't made between these two kinds of buds on the tree being pruned, there's a risk that one will be retained at the expense of the other. So the moment when this distinction is made is the right time to prune. As a result, for all trees with buds that have the proper characteristics as soon as their leaves have fallen, for young trees that have no flower buds at all, and for weak or declining trees that are not expected to yield much fruit, the procedure can be performed from mid-November until March without fear of the wood being damaged by frost. For other trees, it's postponed until the first run of sap lengthens the branch buds & swells the flower buds. This allows a distinction not only between one and the other but even between those flower buds that will be productive and those that won't produce any fruit at all, as happens on some trees. Usually this first run of sap takes place from mid-February

until the beginning of March, or earlier or later depending on the kind of tree & how far along the season has advanced.

Pruning trees just when the flowers are in bloom or faded, or even when the fruit is set, is a practice certain to be fraught with difficulties and inconveniences. Whose hand is so skilled & so adept that he won't damage, disturb, or detach a lot of the flowers or fruit, nor make a cut without harming the growth of a the bud at a point where the pruning is done, or train the branches correctly? Whose eye can discern & distinguish his work among the confusion of branches, flowers, fruit, and leaves after they've already opened up? What a shock & disruption to the whole tree when the production already begun in all of its parts is suddenly interrupted! What a waste of the sap that would have nourished the fruit, strengthened the branches just pruned & healed up their wounds! What a depletion, especially at the base of the tree, is the unavoidable result of pruning that had to be done much farther away, because the sap already had been transported out to the ends of the branches and the fruit had set only in those places! &c. I'm just pointing out the main faults of this practice; they're detailed in several good treatments of this topic. Whoever will have tried it once won't be tempted to do so a second time.

ARTICLE II. *On Pruning Trees in the Open.*

A tree grown on location in the open, or in an individual nursery, managed & planted as we've explained above, is trimmed as soon as it has grown the branches that will determine its shape & that will serve as a basis for all of the branches that it subsequently will produce. From each one of these branches pruned back to three or four buds, one or more new ones will emerge. The following February, four to eight branches at most are selected

from among the strongest, the best situated, of comparable strength and about the same distance from one another, arrayed in a circle with the trunk at the center. They're pruned fairly long, depending on their strength. Some of the smaller branches also can be saved, pruned, & prepared for bearing fruit. (If the tree had been obtained from a commercial nursery, some of its branches may not have been able to be preserved during planting. Of those that have grown out again, the best ones are pruned & straightened during the first two years just as for trees grown on location). Such a tree, unless one wants it to have a uniform shape, will only need to have its dead wood trimmed & a few branches lopped off if it gets too dense or if a branch droops too low or grows too vigorously. Left to nature's care & management, its branches & roots will grow out in all directions. Sap that's carried vigorously and abundantly out to the tree's extremities fortifies it and multiplies the branches required for the growth & stability of the tree. Elsewhere, where the sap flows more moderately or less abundantly, or moves more slowly, it begins to sketch out, so to speak, branches & flower buds, completing & perfecting other ones. From its first years onward, the tree will prove its fecundity & augment it as it progresses in age & in strength.

ARTICLE III. *Definition & General Thoughts on Pruning Espalier Trees.*

THE WALL against which it's planted deprives an espalier tree of half the space & material it would have to spread & nourish its roots & branches if it were in the open. Only the branches parallel to the wall are retained. Of these, some are removed,

others are shortened & fastened horizontally or close to the horizontal. Since trees grow new branches every year, this arrangement, cutting back, & curtailing is repeated every year. The idea is to create a pleasing display against the wall, attractively balanced & symmetrical on both sides of the trunk, well trimmed everywhere without clutter, and to produce fruit that's exceptional in size & comparable in fine quality to that grown in the open. The tree thus is destined to spend its life in circumstances contrary to its natural inclination, subjected to iron from the moment its buds begin to swell until its fruit is harvested. It's always under the watchful eye of a gardener who combines a sharp eye with a skillful hand to put harmony & proportion into his work, good judgment in conducting himself & in making decisions based on the situation at hand, the foresight to conserve his resources for future needs, and to adjust his operations with a view to their outcome & their consequences; someone with a knowledge of everyday natural order & the ability to distinguish situations where it should be followed from those where it ought to be changed, and a familiarity with his discipline, with all of its elements, their purpose, & their use. In short, someone who knows by arrangement & intelligent cutting of its branches, how to achieve for a tree beauty of form & the benefits of fecundity.

These, in summary, are the ideas behind a pruned tree, the definition of pruning, & the attributes of one who wishes to practice it successfully. Some propositions & definitions that we're about to state can be thought of as elements of pruning, in which everything should be performed according to reason & principle, and nothing by habit & by chance.

§. I. *PROPOSITIONS.*

THE following propositions & their interpretations assume that the tree is growing in an ordinary way exclusive of complications & special cases that can alter & upset it.

Proposition 1. The branches & the roots of a tree are reciprocally related to each another. They contribute mutually to one another's vigor & growth, & as a consequence they mutually suffer when one or the other is cut back.

If your pruning leaves the strong branches of a vigorous tree with too much length, its roots will continue to strengthen. They'll multiply these strong branches and the tree will convert to wood and won't set fruit at all.

If you prune them too short & further rid the tree of its small branches, the roots cease to function, and the tree will deteriorate.

So a healthy tree's stronger branches must be retained & allowed a reasonable length while pruning it in order to maintain this proportion & type of balance between its branches & its roots.

If by contrast a tree grows feebly, it's an indication that its roots lack vigor. It has to be freed up during pruning, giving the best branches less length so that as they strengthen, they'll fortify the roots as well.

Proposition 2. A vigorous branch develops only on one side of a tree because for some reason the sap runs more on that side than on any other.

But this same reason will cause, or already has caused, a larger number of roots to develop on the same side. As these roots promote & increase the strength of this branch more and more,

it will become excessively forceful & harmful to the nearby branches & sometimes to the rest of the tree.

As soon as some branches get to be much stronger than the others, they have to be removed or restricted to prevent or to stop the ill effects they have on the other branches & on the roots.

Proposition 3. In nature, sap propelled by a root is carried mainly to the branches on the same side as the root.

If one side of a tree flourishes excessively & overcomes the other side, and pruning can't reduce its vigor, the source of this energy undoubtedly lies in its corresponding roots. So some of the strongest roots have to be exposed and cut back to their origins to balance the two sides of the tree. But this drastic remedy should be used only in extreme circumstances & with great care, because it sometimes happens that roots don't correspond to branches on the same side, but to those on the opposite side. In that case the weaker branches necessarily would be lost as a result of the operation.

Proposition 4. Sap moves forcefully & abundantly inside a branch depending on how close it is to the vertical.

A tree tends to grow to a height typical of its species; as the vertical branches alone favor its height, the tree strives to extend & and strengthen them more than the horizontal ones. Additionally, the top of an espalier tree always fills out sufficiently due to the tendency of the sap to rise up to it.

So if you permit strong branches to grow up vertically, the sap will carry its richness & its main activity up to them,

the horizontal branches will dwindle, & the lower part of the tree will thin out.

Proposition 5. The farther that the sap moves away from the center of the tree, the more active it becomes.

The sap exerts its main activity at the tender tips of the branches where it finds much less resistance than it does at their origins where the woody layers have hardened. It puts out many new branches at those places in proportion to its quantity. The result is that if you prune a branch that has eight branch buds, & if there's only enough sap to open three of them, the three that open will be at the tip, & the five others will remain dormant.

So one must 1°. avoid pruning a branch too long, leaving too many outlets & making it too easy for the sap to leave the middle of the tree that soon will become bare.

2°. Avoid pruning too short, which forces the sap to act too forcefully & abundantly on the small number of buds remaining on the newly pruned branch and yield only strong branches. Moreover, pruning too short in this way forces the sap to flow back into previously pruned branches and to open up abnormal outlets & to produce false wood branches.

3°. If one side of a tree predominates, its strongest branches must be pruned short so that the sap, encountering more resistance & fewer, more restricted outlets there, & consequently less favorable circumstances for its function, will generate only moderate growth in that location. But all medium & weak branches that can continue on there without disarray must be kept & pruned long so that the sap is consumed & isn't forced to open up any abnormal channels. The weaker side, in contrast, should be freed of all of its weak branches. The medium ones are pruned short, retaining only those necessary for filling out its shape. The strong branches are pruned long in order to attract the main movement of the sap.

Proposition 6. The action of the sap on the buds of a branch is proportional to their distance or their separation from the origin of the branch.

New branches that stem from developing buds on a pruned branch will be stronger the closer they are to the tip of the branch, (provided that it's not tilted horizontally) & they'll be weaker the closer they are to its origin. Frequently, new branches emerging from a vertical shoot within which the sap rises abundantly & unimpeded are so consistently different in strength & length from the highest one to the lowest that one could almost imagine that the effect of the sap on the topmost bud & on the lower buds of a branch is like the pressure of a liquid on the bottom & on the sides of a vessel.

I added " provided that the tip of the branch is not tilted horizontally". Because if a branch is curved, the greatest effect of the sap will be on the uppermost bud, or on the one located at the top of the arc, where its growth will produce the strongest branch. The other branches will have less strength the farther away they are from it & the closer they are to the ends of the curved branch.

These degrees of strength aren't in such exact proportion on horizontal branches where the buds on the upper side normally produce stronger branches than those facing the ground. Consequently, if the terminal bud is on the underside & the penultimate one on the upper side is higher up, the latter bud will yield a stronger branch than the one at the tip.

So every branch that becomes strong at a place where it should be weak, or weak where it should be strong, isn't a natural one & generally should be removed.

Proposition 7. Leaves have a considerable effect on the quantity & the movement of sap, increasing or decreasing it in proportion to their number & their condition.

If a good deal of the leaves have been removed, if insects have devoured them, if they've been damaged by blight or by some other disease, the activity of the sap will decline or stop; the fruit drops off & the tree deteriorates.

So the excessive growth of a vigorous branch can be curtailed by stripping off some of its leaves, that are attached like so many suckers and that supply much nourishment to the branch.

Proposition 8. The elongation of shoots is inversely related to the hardening of their woody layers.

The less hard the woody layers are, the farther out the shoot extends, & vice versa. But hardening of its woody layers is slowed to the extent that it draws more sap. And the sap is more abundant & active the more the shoot is oriented away from the horizontal toward the vertical (4), supplied more with leaves (7), and shaded more from the sun that could make it transpire & harden.

Favoring these three causes increases elongation of a branch. Eliminating or diminishing them stops or slows its progress.

§. II. *DEFINITIONS.*

THERE ARE seven kinds of branches on fruit trees: wood branches, fruiting branches, stunted branches, twig branches, suckers, false wood branches, and small fruiting branches.

Definition 1. A wood branch is one that originates from the terminal bud,

or the highest bud on a branch that has been pruned or shortened. It's usually the longest & strongest of those produced by that branch. It should appear vigorous, with live bark and well formed buds that are not far apart from one another.

Destined to yield other wood branches & fruiting branches, & thus essential for the shape & the fecundity of the tree, it should be preserved & treated more carefully than any other. It's pruned from four to twenty-four inches, depending on the species, age, and strength of the tree. A pear tree is pruned longer than an apricot tree; a winter pear longer than a St. Germain; an old or deteriorating tree much shorter than a young or vigorous one.

Definition 2. Fruiting branches are those that originate between the last bud on a pruned branch & the point of the previous pruning. They're shorter than wood branches, & diminish in strength the closer they originate to the point of the previous pruning (*Prop. 6.*). Like the wood branch, they should have live bark and large buds not far apart from one another.

Their name indicates their use & their purpose, so they should be preserved & pruned to allow them to fulfill their objective. The length to prune them depends on where the fruit buds are located. If they're near the origin of the branch, it's pruned short. If they're farther away from it, it's pruned longer. Be mindful to prune it at a wood bud & not at a fruit bud, because (*Prop.* 7.) beyond the fruit there have to be leaves on the branch that bears it.

Definition 3. A stunted branch is a fruiting branch,

thin, long, and slender, with flat buds that are far apart from one another. It also originates at the point of the last pruning. Its weakness makes it incapable of sustaining fruit well or becoming a good wood branch. As a result, it's removed. If there's a gap to be filled or one to be prevented, it's pruned back to a single bud from which a branch in better condition can emerge. It's treated the same way on vigorous trees that have to be filled out by pruning, provided that it won't create clutter.

Definition 4. The twig branch is a small stunted branch. Possessing the same defects, it should have the same fate.

Definition 5. The sucker is a degenerate fruiting branch, or one that's emerged in place of a fruiting branch at the point of the last pruning. It's stronger than, or at least just as strong as a wood branch; it's long, big, and straight, tending in a vertical direction. Its bark is green; the buds are flat & far apart.

Since it grows unnaturally & can't but disrupt the shape & the foliage of the tree, it has to be curtailed. As soon as this branch is noticed and recognized, it should be pinched, re-pinched, & suppressed by various means (*Prop.* 7. 8.) without cutting it off, lest the abundance of sap contained in it be diverted to neighboring fruiting branches & cause them to degenerate.

Definition 6. The false wood branch is one that arises unnaturally at a place other than on the branch of the latest pruning, i.e. it originates at the point of an earlier pruning, or even on the trunk of the tree. Sometimes it has the characteristics of a good wood branch; most often it has those of a sucker & is only distinguishable from one by its point of origin.

On young trees & on those in their prime, it should be treated like a sucker, unless it's needed to fill a present or anticipated gap or that it's turned out to be better than an authentic neighboring branch. In that case it's pruned as though it were a wood branch. When it's being cut back, & there's no longer any concern about clutter at its origin, it can be cut back to a *ligne* [see translator's note, p. 0053], or, as the expression goes, thin as a dime. As a rule, one or two small fruiting branches will emerge at its insertion point. It's better to cut it, or pinch it as soon as it appears, rather than waiting until the February pruning, making sure beforehand that the branch from which it emerges isn't deteriorated or diseased, because in that case it would be necessary to train & ready it for replacement. Sometimes false wood branches break out just in time on the trunk of an old tree; the trunk is cut back to these branches & they regenerate the tree.

Definition 7. A small fruiting branch, on trees bearing stone fruit, is two inches long at most, well nourished, supplied with fine buds along its entire length, or terminating in a cluster of flower buds & a leaf bud. If this last feature is missing, the branch is removed because it will be unable to nourish its fruit. M. de Combes calls it a *bouquet* on a peach tree, & it could be called the same on all trees with stone fruit. It yields fruit for one, two, or three years at most, & then dies.

On other kinds of trees, the small fruiting branch is six to fifteen *lignes* long, knotty, & looks as though it were made up of parallel rings and terminates in a large bud. In springtime a bouquet of flowers emerges from it & next to the bouquet, one or two buds with some leaves. After the fruit ripens, the tip of the branch that bore it dies.

The following spring, buds that had formed at the origin of the common flower stem, or next to their pedicels, open up & likewise produce flowers & new buds, & do so successively for six or seven years at most. As a result, the branch ramifies & reaches a length of six to eight inches, crooked, knotty, and uneven in thickness.

A small fruiting branch should be kept intact & not pruned, regardless of the branch that it's on & its orientation.

ARTICLE I V. *Pruning a Young Tree.*

At the end of April or the beginning of May, I examine the condition of trees planted during the previous autumn or winter. I'm familiar with all the types of branches on a fruit tree, their uses, and the natural order of their production & their growth. I know that the main consideration in pruning a tree should be to form or to keep all parts of it filled out & well trimmed, to allow the sap to act equally on both sides of it, to achieve uniform strength and breadth, and to keep an eye on the top of the tree so that it doesn't overgrow and on the lower part so that it doesn't thin out.

FIRST YEAR. An example is a tree like the one shown in *Fig*. 1. I save branches *A, B* if they're equally strong. In addition, if the two branches *D* and *E* are equal in strength, I save them as well. I pinch off or cut off branches *C* and *H*, where *H* is poorly positioned & *C* will make one side of the tree stronger than the other. I can keep *F* and *G* that are soon to bear fruit.

If the tree has produced only three strong branches, e.g. *E, D, A* or *E, D, B,* I'll keep only *E* and *D*.

If it's produced *F* and *G,* & strong branches only on one side, e.g. *B, D* or *E, C, A,* I cut off the latter & keep only the two small branches *F* and *G,* that will strengthen as a result of cutting off the others.

If it's produced only *E* and *H,* or *E* and *A,* & if it's a peach or a plum tree whose branches re-grow with difficulty, a branch must be crossed over to the side that hasn't grown one. If possible, this should be the highest branch, so that it's awkward new position prevents it from exploiting its height to gain more strength than the other one. If it's a tree that puts out branches easily, these two branches have to be removed in the hope that two better situated ones will emerge. One of the two branches also could be cut off & another one grafted onto the side of the trunk opposite to the one that's being saved.

If *H* is the only one that's been produced, it can be saved. But it has to be pinched off at the fourth or fifth leaf to make it put out lateral branches. The trunk of the tree will be several inches higher. This branch must not be pinched off until it's acquired some firmness; because if it's too soft, the part that's retained will extend farther, & the shoots coming out of it will be too far apart from one another. That's why if the tree's branch only has come out late & its shoot can be pinched only close to the time of the second run of sap, it's best to leave it intact until the following February & to prune it at that time to two or four buds depending on the number of branches needed.

None of these suggestions are of any use for a tree grown on location or in a particular nursery.

In the end, the important point is that there be two or four strong or weak branches, either way, as long as they're of equal strength & well situated on both sides.

When only two have grown out that meet these conditions, whatever they are, even if they're unmistakably suckers, I keep them despite the opposite practice of most other gardeners. 1°. Because they're fit to be used as a base & a foundation for a tree, & at present that's the only objective. 2°. Because with a little care & attention they'll lose or modify their bad features & will yield excellent branches, both for fruit and for wood.

In June I train the branches that I've saved. I arrange & hold them down in a way appropriate for them to adopt from the outset the tendencies that they should always maintain.

IInd. YEAR. *First Pruning.* (*Fig. 2.*) In the middle of the following February I prune the branches from three to eight inches, more or less according to their strength. If the wall is six to eight feet high & the previous year I've kept only two branches, one on either side, they'll be inadequate to form a tree of such a size. I therefore prune them back to three or four buds so that two strong branches will emerge from the end of each one. Upon these I'll grow the entire structure of the tree. *Fig. T.*

Several gardeners cut back right onto the trunk, or prune the first year's branches back to a single bud in order, so they say, that the base & the roots of the tree will strengthen. But (*Prop.* 1.) what happens is completely the opposite. Very often the tree doesn't put out any new growth where these branches had been inserted, but produces others elsewhere that are poorly situated & weaker than those of the previous year. As a result, the harm to the tree from this practice at minimum will retard it for a year.

In May I inspect the new growths on the tree, & if a strong branch has grown out from the trunk

such as *I* (Fig. 3.), I do away with it. Of the shoots emerging from the pruned branches, I nip off those originating on the side next to the wall, or on the opposite side, & I save only those that are well placed, unless the tree shows too much vigor. In that case it's better to leave the useless branches to absorb excess sap than to allow the good branches to degenerate into suckers. In June I train the young branches that I've saved. Noting that branch *K* has become too strong & grown too much & is turning into a sucker, I pinch it off close to its origin rather than cutting it off completely, so that small branches will emerge from it. Otherwise the sap, blocked from escaping via this route, gets carried too profusely into the upper branches & causes them to deteriorate.

IIIrd. YEAR. *Second Pruning*. In mid-February, with the tree in the condition shown (*Fig. 3.*), vigorous, but not excessively so, & not overgrown, sufficiently provided with branches well arranged to give it shape & even soon to yield fruit, I prune the strong branches *L, M, N, O* to ten or twelve inches & the medium branches to four or six inches. I leave intact, or prune back to two or three buds, all of the small branches that are necessary to draw off the sap, & that for the most part I'll cut off if the tree is weak. Finally, I keep branch *P* short so that it won't take advantage of its position at the top of the tree & its origin from a sucker to strengthen & to draw too much sap onto branch *L*. *Fig*. 4. shows how this tree is pruned, made easier to the extent that it was prepared by nipping off all useless & poorly located branches.

Fig. 5. In May, when the pruned branches appear to have produced many new ones, an indication of considerable vigor in the tree, I nip them off judiciously,

cutting off only the badly placed branches & saving all those that could be positioned in an orderly fashion for training. There's a concern that removing a large number of them may impair the roots of the young tree or make suckers & false wood branches appear, or cause the small number of retained branches to become too vigorous. Any one of these outcomes will require too great a cutback. As soon as branch *a* is identified as a sucker, I pinch it off to five or six buds, so that as its sap becomes shared among several lateral branches, it moderates. If it produces others of the same kind, I'll subsequently pinch them off. I give the false wood branch *b* the same treatment, as well as the two branches *e, d* that get too strong. On a trained tree, I'll nip off all of these branches, but a young tree must be treated less severely. Shoots coming out of branch *n o* alert one to take care that it doesn't draw off the main activity of the sap to the detriment of the other branches.

IVth. YEAR. *Third Pruning*. In the middle of the following February, to prune this tree (Fig. 5.) 1°, I cut off the sucker *a* & the false wood branch *b.* I dismember & trim branch *c* down to the lowest & weakest of the three that it has produced. As a result of this cutting back, the tree becomes a bit more uniform in its complementary parts. 2°. I fill out *n o* with all of the small branches that it has, to draw off, or, as the gardeners say, to "entertain" the sap & forestall the development of new sucker shoots or ones that are too vigorous. Since branch *f* is unnaturally stronger than *g*, located at the end of the previous pruning, I keep the latter & I prune it so that it will be fit to become a good fruiting branch. I prune branch *f* as a wood branch, cutting it back to the lowest ones that it has produced, always with a view to diminishing the strength of branch *n o*.

If the tree were not so young, I'd lengthen it, or I'd even leave the small branches intact & I'd prune the wood branches short. Because if the latter branches are pruned long, they put out shoots only at their tips, and gaps necessarily will appear when the small branches die. That's why I said (*Prop.* 5.) that if one side gets overgrown, it has to be pruned short & filled up with small branches. (This proposition will be clarified further below). But our young tree, because of its habit, leaves no gap to be concerned about; I prune the principal shoots of branch *n o* almost to the same length as those on the other branches. 3°. On the other hand, I thin out branch *u x*, even disposing of the medium-sized branch *z*. I only prune the strong branches & I train them slightly less horizontally than those of branch *n o.* 4°. As to branches *r s* & *t y*, since they're below the others & form the lower part of the tree, I retain only the good wood & fruit branches there. I eliminate all the stunted & twig branches, & only the upper branches are pruned a bit longer. The pruned tree is shown in *Fig. 6.*

We've accomplished the objective that we had set for ourselves. The shape of the tree is determined and assured. We've already even gathered the first fruits of its produce, or it's ready to present them to us. As it gets larger, we'll reduce the length that it's pruned & reduce the number of branches that could have been necessary to fill it out, to suppress the overgrowth of its early youth. Nevertheless, we'll continue to manage it according to the same principles & to control it by the same rules; we'll only change the technique. But before presenting a brief final summary, we'll add a further point.

Pruning consists only of general rules; it can't have any other kind. 1°. Because species, variety, age,

strength, or condition of the stock, is not fixed & determined. 2°. Because its purpose varies with the viewpoints of the owners. Some have in mind simultaneously the beauty, endurance, & fecundity of the trees that they prune. They sacrifice some of the latter for the benefit of long-term enjoyment & visual satisfaction offered by the fullness, balance, breadth, & uniform proportions of a well pruned tree, even during the most unrewarding of seasons. Others find that the most misshapen tree is beautiful as long as it's quite full of fruit. Content with this end, they prefer a few years of plenty to a long series of years with mediocre yield. 3°. Because the natural growth & development of branches often is upset by disease, inclement weather, deterioration of the roots, a variety of accidents, & many unknown causes that produce changes & disruptions that the greatest of intellects couldn't predict & that the totality of knowledge & experience rarely can prevent or remedy. So we can state generally that vigorous trees must be pruned long & weak ones pruned short; that pruning its large branches long & filling it in with small ones maintains a vigorous tree, but sometimes clutters it up; it ruins a weak tree. Pruning large branches long & thinning out some of the small ones neither will restrain a vigorous tree nor make it bear fruit; it exhausts & lays bare a weak tree. Pruning big branches short & filling out the small ones can hold back a vigorous tree & exhausts a weak tree. Pruning big branches short & thinning out small ones ruins a vigorous tree through the roots or through the growth of suckers & false wood, but it keeps a weak tree in good condition, &c. But it would be fruitless for us to undertake a tedious account of an almost infinite variety of individual cases. Some of these can be determined only in the context of the tree's condition that of necessity must be known & directly observed,

because they affect its management. Others would require a lot of hypotheses that are more apt to bore & embarrass than to enlighten.

ARTICLE V. *Pruning a Trained Tree & Bush Trees.*

LET'S go back now to our tree, & let's say that it's grown to be twelve or fifteen years old, kept in good condition, well supplied with all kinds of branches, and has not suffered any serious harm from disease, mishap, or mismanagement.

To prune it, 1°. I completely loosen its branches & clean it of reeds, osiers, dry leaves, & everything that might betray a gardener's carelessness or serve as a haven for insects.

2°. I cut off all the branch stubs, calluses formed from cuts made too closely, dead & exhausted branches, or those afflicted by gummosis or cankers.

3°. Since wood branches are the essential parts of the tree, & the progenitors of all of the other branches, I first make certain that a sufficient number of them are in the best of condition. Beginning with the lower part of the tree, I select for wood branches the handsomest and strongest ones that have grown out from the ends of the previous pruning; I adjust the length that they're pruned to five to twelve inches, according to the vigor & the strength of the tree. I'll make them even longer on a peach & on a pear tree that hasn't yet been restrained. Proceeding toward the top of the tree, I prune some of the less strong ones, i.e. branches of secondary strength, or the strongest of the medium ones, as wood branches, on which I minimize the pruning. When I get to the top of the tree, instead of pruning the strongest branch that emerged from the last pruning as a wood branch, as I did lower down,

or the lesser of the two strongest ones as in the middle of the tree, I minimize the last pruning on the medium branch that's the best placed & best conditioned of those located below the strongest ones. (I'm assuming that the branches pruned the previous year have produced several new ones, something that rarely fails on a healthy & vigorous tree). I prune this medium branch as a wood branch, whether it has any fruiting buds on it or not. It will strengthen considerably as a result of cutting off the highest one or ones.

4°. After providing my tree with the wood branches that are an absolute necessity, I turn my attention to the fruiting branches that accomplish the really useful purpose for cultivating fruit trees. Once again, beginning at the bottom, I save only the ones sufficient to keep the tree filled out, selecting the strongest & best located ones & cutting off all those that are too weak to be able to generate fine produce & to nourish it well. In contrast, I save the one at the top of the tree as long as it can get by without creating clutter, unless it had been exhausted by its productivity from the previous year. The length that they're pruned, from three to eight inches, depends on the position of their fruit buds.

There are some who save only one medium branch to serve as a wood branch & a fruiting branch, from all of the branches that grew from the last pruning. Others keep two, the uppermost one for wood, the lowest one on the opposite side for fruit. Some retain even more of them. There can't be a strict rule for this. It's determined by the extent of the previous pruning, the strength of the tree, & its location. Saving two branches on a pruning of three or four inches will create crowding & will overload a tree that such a short pruning had assumed to be weak. A single branch left on a pruning of twelve to fifteen inches won't fill out the tree sufficiently,

& will create gaps or false wood branches on a tree that such a long pruning had assumed to be very vigorous.

5°. I strip off all twigs & stunted branches from the lower part of the tree, unless they were the only source available to fill or to prevent a gap. (*Defin.* 3). Concern about a similar defect, or the need to consume some sap that's too plentiful, could be reason to keep some of them at the top.

6°. I cut off all of the suckers & the false wood branches, unless the tree requires that the latter be treated otherwise. (*Defin.* 6).

The top of a tree, where the sap rises most actively & profusely, can be thought of as a "vigorous tree", & the lower part, that gets less sap, as a "weak tree". So the latter's strong branches should be pruned & the small ones thinned out. The "vigorous tree", on the contrary, should have its medium branches pruned, the large ones removed, & be filled out with small ones. The same analogy applies to the strong side & to the weak side of a tree. Our method is based on the principle that distributing the sap at the top of the tree among a large number of weak branches where it finds only narrow passages diminishes its force & reduces its effect. By contrast, collecting it in the lower part of the tree into a few strong branches whose unrestricted outlets offer no resistance to its action maintains or even increases its force and its effect.

Secondly, a weak tree should be pruned short, & a strong tree should be pruned long. We follow this rule, taking the terms *long* & *short* rigorously & in their strict meaning. We'll add to this rule if we mean these terms in a relative sense. Pruning long in fact means pruning to ten or twelve inches; pruning short means to prune to three or four inches. But given two branches, one strong

& the other weak, if pruned to eight inches, the latter will be pruned “long” & the former “short”. With two trees, one vigorous & the other weak, both pruned to six inches, the latter is pruned “long” & the strong one is pruned “short”. Thus the strength or weakness of the tree determines the meaning of the terms *to prune long* and *to prune short* just as it determines the meanings of the terms *strong branches* and *weak branches*. So when thinking of pruning relative to the strength of branches, we prune the lower part of the tree short, & we prune the top quite long, since we give medium branches that we prune at the top as much & usually more length than we give to strong branches that we prune at the bottom.

Thirdly, the lower part of the tree should be wider than the top, to avoid giving the tree the shape of a semicircle, or, as the gardeners put it, making it into a peacock’s tail. We still fulfill this requirement because the lower part of the tree, pruned on branches that had emerged at the ends of the last pruning, is necessarily more spread out than the top where pruning has been minimized.

Nota. 1°. On trees bearing stone fruit, especially peach trees, branches that have borne fruit must be cut back to the lowest one that’s emerged, provided that it’s in good condition. This renovated branch, the beneficiary of all of the sap that it would have shared with the part that had been removed, will nourish its fruit much better than would a branch exhausted by the production.

Nota. 2°. Sometimes a tree gets carried away with such fervor that it’s very difficult to restrain it, to train it, & to make it bear fruit. If it’s young, pruning it very short to weaken its roots sometimes works; often it only serves to stimulate the activity of the sap & to generate suckers & false wood branches. Not pruning it at all, or pruning it very long & filling it out with small branches, is the customary procedure.

But sometimes that strengthens the roots, & consequently the branches, even more. In a short time the tree takes on a height & breadth detrimental to its base & to its center. Instead of being low & well filled out, it grows tall & sparse. So this practice is appropriate only for trees that readily put out branches from old wood and that tolerate hard pruning of branches that still are too long after they've been reduced. If a strong branch emerges at the top of the tree, prune it long, cultivate it, & shape a top on it as though it were a second level. It's removed when the lower level, actually the real tree, has settled down & set fruit (it's pruning continues & it's treated according to the rules). This is the safest method.

M. de la Quintinye suggests disregarding branches cut to a stub, shoots two inches long, or a few big branches, even false wood ones, if they're in places where they won't spoil the shape of the tree, won't cause crowding, & are where they can be removed when the ones from which they originated will have set fruit. This is the same method as the preceding one; but it's hard to find places for these branches on the side without their creating clutter while they're there or gaps when they're cut off.

Nota. 3°. Prune only next to a healthy bud. Cut close to it so that no stub remains behind. Cut it cleanly & obliquely so that it recovers sooner. Prune next to a bud situated on the side of & not at the front or the rear of the branch, so that the one that emerges from it will be properly oriented. Keep the hand that supports the branch below the cut, to prevent the pruning knife from turning around, &c. Common sense & a little experience are enough to learn these small details.

The villagers of Montreuil, famous for cultivating fruit trees, especially peach trees, retain

wood branches, false wood branches, & even the most vigorous suckers equally, & promote their length & their size by training them vertically. They prune all of these indiscriminately to be wood branches; for fruit, they prune the strongest and the best of those that have emerged in the same year. They extend their wood branches to two-&-one-half feet long, sometimes even longer if it's a vigorous tree. The first time they prune these branches, they don't incline them at all if the shape of the tree doesn't require it. When pruned very long & held almost vertically, they acquire the same strength & quality as though they'd been treated that way. And when after several years this series of pruning generates branches of considerable length, they take advantage of their length to bend them, to tilt them to the sides, & to open up the tree. As a result, the branches in the middle & at the top of the tree are now situated on the sides. They treat new false wood branches, or suckers that emerge from them, the same way. They have intelligence, observation, long experience, & - a great teacher – the interest of the townspeople themselves. They are people who are busy their whole lives cultivating their trees and have fashioned, perfected, and adapted to their region this method for greatly lengthening pruning on their trees, especially while they're young, pruning only the large branches, & giving preference to those rejected by other methods. Landowners with espaliers set up on ground of similar quality, soil that's inexhaustible, where the same productivity seems to renew itself incessantly or even increase, will be able to practice this method as successfully as do the villagers of Montreuil. But you have to study under them and learn from them, & such a course of study takes more than a year. At any other place, a successful outcome is very doubtful at the least.

Attempts made in several gardens in Paris as well as in its surroundings even by gardeners from Montreuil have not realized their hopes & those imagined by the owners. This is proof that this pruning method ought never to leave its place of origin, & that no one can transfer it to a different region without detriment to his trees & to its value.

The entire structure of a bush tree should be grown on three or four main branches arranged around an extremely short trunk. During its first years it can be trained on small hoops to make it take on the round shape appropriate to it. Although the arrangement of its branches is different than that on an espalier tree, the pruning is the same. The particular considerations that it demands are: 1°. to keep it equally trimmed all around; 2°. to cut off all branches that arise on the inside and on the outside of the bush; the latter because they'd give too much breadth to the top, the former because they'd fill in the part in the center that should be left empty so that sunlight gets in easily to lignify the wood & to ripen the fruit. 3°. to prune it short so that the tree doesn't get too tall (raising or minimizing the previous pruning of the lowest of its good branches is one of the best ways to keep the tree low), & so that its branches, since they are neither fastened nor supported, can withstand the force of the wind & the weight of their fruit, under which long branches would give way.

But the large areas of ground made incapable of other production by the shade of bush trees, & the difficulty of tilling the soil beneath their branches, to a large extent has discredited them & put them out of fashion. They're no longer grown except in areas dedicated exclusively to trees, or in very large kitchen gardens where only the middle of the crop patch is cultivated. Fan-shaped trees, a row of fruit trees, trees in counter-espalier and in rows, encumber gardens less,

produce virtually the same result, & are more decorative to look at.

ARTICLE V I. *On the First Training, & on Shelters.*

ONCE THE TREE is pruned, it's trained, i.e. its branches are fastened to a wall with *loquettes* [*Translator's note*: see p. 0100] in a proper orientation or on a trellis with small osiers that are green or that have been soaked in water to make them supple & pliant.

1°. The branches should be equally spaced so that the tree is uniformly filled out everywhere & not crowded in one place & vacant in another.

2°. They should incline to the sides & not be arranged like the slats of a fan or the spokes of a wheel. That way the lower part is kept full & the top doesn't get too overgrown.

3°. The branches never should cross or overlap one another unless there are gaps that can't be filled in or prevented any other way.

4°. Is it necessary to warn that a band that's fastened too tightly causes swellings, thickenings, & other deformities on a branch, and sometimes even gummosis, on trees that are tied that way? that passing an osier across a bud must be avoided? that if the tip of a branch can't reach as far as a lath on the trellis, one should be supplied, either by means of a rod attached to the trellis, or by putting a handle or a ring onto one end of an osier through which the tip of the branch is passed & attaching the other end to the trellis so that the branch is properly fastened? to orient toward the top of the trellis those branches whose tips are pointing to the wall? to correct the curves & false contours of branches with such defects or to prevent their tendency to develop them? In a word, to carry out the training with all the neatness

& all the necessary care upon which a fine arrangement of the tree's branches depends, & consequently its uniform shape.

After training, the espalier planting beds are tilled, if they aren't occupied by winter lettuce or by other vegetables that are all too commonly planted in them & that require postponing the tilling. There's no further tilling until autumn, but they can be hoed frequently to get rid of bad weeds, to allow light rains to penetrate the soil easily & to keep it from cracking.

SHELTERS. The vagaries of inclement weather during the season in which trees bloom sometimes destroy in an instant all of the grower's expectations. Among the various ways used to protect against these wretched misfortunes, there are those such as cloth curtains that are closed during the night & opened up during the day, unless snow, hail, or cold rain, &c. is falling. These are costly & need lots of time, frequent care, & a good deal of attention beyond just opening & closing them. When the wind shakes them, they can bring down a lot of flowers & fruit that have set. They're only suitable for gardens whose owners can afford the cost. Other means, such as ordinary straw mats placed directly against the trees, or large mats as high as the whole wall, mounted on laths & placed very close to the trees, are even more detrimental to espalier trees. The former because they dislodge a lot of flowers, fruit, and young shoots each time they're put up & taken down. And both kinds because if they're not removed each time that the weather permits, & if they're left in place too long, the fruit on the trees, softened & etiolated beneath these covers,

perishes as soon as it's exposed to air & sunlight. Add to that their cost, the time involved, the attention required, the trouble, & their short duration. The only improvements that have appeared to date are small canopies made of straw mats, very thin boards, large oilcloths, &c. These are placed below the coping on small hooks fastened into the wall or tied to the trellis, or attached on one side to the trellis & on the other to poles. These are driven into the planting bed at a convenient distance from the wall, or supported by whatever means one can devise. The canopies, eighteen to twenty-four inches wide, & of optional length, joined to one another at their ends, are put in place as soon as swelling of the buds indicates that they're about to blossom. This happens around mid-February, or sooner or later depending on the type of tree (some bloom sooner than others), the terrain & exposure, the course & the nature of the season, &c. that can advance or retard flowering. They're removed when there's no longer any fear of atmospheric damage, usually in April or May. Even if they don't protect the trees completely, they at least shelter parts of them from hail, snow, cold rain and damp frost, severe scourges especially when followed by sunshine. It's not the cold itself, but it's damp cold followed by sunshine that the trees dread in the spring. These canopies don't have the same problems as the other shelters mentioned above; they don't cost as much, nor do they need as much care. They can be used for fan-shaped trees, counter-espaliers, & trees in rows by making them wider & arranging them so that they cover both the front and the rear of the trees.

ARTICLE VII. *On Pinching Off.*

THIS operation, derived from viniculture & applied to all trees from which superfluous shoots are removed, is performed without the help of metal instruments. The thumb is enough & is preferable not only because it's quicker, but also because it extirpates the shoot down to its *rudiments.* As a result, removal is complete & no other branches will emerge from a knot pinched off this way, whereas if the shoot is cut with a fingernail or with a pruning knife, there almost always are some small branches that emerge from the rudiments remaining on the parent branch.

A pruned tree hastens to make up its losses; & if its enthusiasm is backed up by its strength, toward the end of April it will be supplied with more branches than it had before it was pruned. To prevent the crowding caused by so many new shoots, the ones that could only spoil the shape or the fecundity of the tree must be cut off right away. Examples are 1°. those that emerge on the side of the branch that faces the wall, or on its opposite side, & that never could continue in that direction. 2°. those that stem from former prunings or directly from the trunk of the tree & that should be regarded as false wood branches, unless they're needed to fill a gap, to replace some worn-out branches, or even to revive an old tree. In that case they're preserved & they're treated with this in mind. 3°. those that appear as doubles or triples from the same knot & that must be reduced to the single one that's turned out the best & in the best condition.

But this first job is merely a prelude to the pinching off that's done toward the end of May. At that time almost all of the branches have developed from the last pruning & from other places, & they've made enough progress to be able to discern their character & to decide on a suitable treatment for each one.

Fruit that has set, stopped growing, and that has avoided the worst dangers, deserves special attention.

1°. If most of the buds on a wood branch have opened & it has a lot of shoots, the only shoot to be saved is the one coming out at the tip, & two others near the lower part of the pruned branch, that are in good condition & well situated on opposite sides from one another. The rest are pinched off.

2°. If a fruiting branch has kept its fruit & has produced no shoots, or if it hasn't set any fruit but has produced shoots, or if it has both fruit & shoots, in the first two cases, it's cut back to the second bud, or to the second shoot.

In the third case, the fruit may set at the top, the bottom, in the middle, or along the whole length of the branch, either a few or a lot of them. To begin with, if the branch has set only three or four fruits, keep them all. If it's set a lot more, they're reduced to a number that's appropriate for the strength of tree, for its species, or for the variety of the fruit. Four peaches, pears, apples, or apricots of the large kind are sufficient. A fruiting branch can nourish a larger number of early peaches, small muscatel pears, plums, lady apples, Holland apricots, &c. A vigorous tree should bear more fruit than a weak, old, declining one. Be careful here to resist being tempted by excess. When two fruits of very short-stemmed species are fixed on the same bud, since they both can't achieve perfection, one must be sacrificed in favor of the other, the lesser one for the finer, detaching the former without loosening the latter. Twin fruits are cut off. Fruit that's set near the origin of the branch are retained in preference to those set near the tip. Once a suitable number of the finest of the fruit,

the best situated and best separated to grow successfully without damaging each other have been selected, the surplus ones are disposed of & the branch is cut back as far as the shoot above or next to the uppermost fruit. Shoots next to the fruit below them are pinched off or curtailed, i.e. cut with the fingernail to leave a stub the thickness of two coins. If two shoots have originated next to the fruit, one is split for propagation & the other is pinched off. If shoots have grown out near the origin of the branch below the fruit, one or two of the lowest ones are saved if the wood is needed there. If not, only the one at the tip of the branch is kept, which is necessary for drawing sap to the fruit that it bears. All shoots not accompanied by fruit are pinched off.

However, since up to about the middle of June the trees themselves drop the fruit that they can't sustain, & since bad weather, insects, sunshine, and mishaps make it fall off at the time that the shoots are pinched off, it's better to remove only the ones that could persist to the detriment of others, or that themselves can come to no good, & to postpone removal of the others until the training period. This is especially true if a very vigorous tree needed them to absorb an excess of sap. At that stage, only those that can attain the beauty suited to the fruit of espalier trees are to be kept, without concern for losing the bulk of the produce. A modest amount of large fruit of good quality is the equivalent of more small fruit in firmness & ordinarily greatly surpasses it in quality. I say ordinarily because there are types of fruit where the smaller ones are just as good as the larger. The tree is left to bear them on its own. Besides, this removal is hardly ever performed except for peaches, pears, apples, and apricots. For the latter, it should be done from May onward. Similarly, it's better to pinch off shoots

that accompany the fruit only when the pit has formed in this kind, & when they've almost reached their maximum size. Drawing more of the sap, these branches are nourished more plentifully. This operation doesn't pertain at all to fruit with seeds, since they have no accompanying shoots.

4°. If a shoot displays excessive vigor & appears as though it will become a sucker, it's cut off, unless there's a concern that the neighboring branches will inherit its nourishment and also will take on its strength & degenerate. Because in that case it's better to pinch it above the fifth or the sixth leaf & to curtail it by the methods described above.

Nota. 1°. Small fruiting branches should be spared during pinching off as they are during pruning.

Nota. 2°. Pinching off should be more or less rigorous, according to the age & the vigor of the tree. On an old or a declining tree only a few of the fruits & the best of the shoots are saved. The others are removed as soon as the decision can be made, so that they don't needlessly deplete the sap. On a young or a very vigorous tree, on the contrary, only shoots that are poorly situated & those that would cause crowding are cut off, & this is done later on. The preceding proposal assumes a tree that is somewhere in between.

Nota. 3°. If one side of the tree becomes stronger than the other, its pinched off there more than on the weak side. 1°. so that for the remaining shoots on the strong side that are uncovered & exposed to air & sunshine, transpiration and the hardening of their woody layers moderates their growth. 2°. and so that with a large number of the channels available to the sap now cut off, it will be forced to change over to the other side.

Nota. 4°. Shoots that slip behind the trellis have to be pulled back, fruit confined or obstructed by the trellis, the wall, osiers, &c., must be freed up,

and branches afflicted by gummosis, canker, or other diseases, must be re-pruned below the affected part.

The benefits of pinching off are easy to see. The fruit & the remaining shoots alone enjoy the benefit of all of the sap that they share among themselves, perhaps even to their advantage, from the surplus fruit & needless or harmful branches.

Protected from etiolation, the air & sunshine bring them to fulfillment & give them their desired quality. A tree cleared of its disarray will see its productivity increase & will be enhanced and strengthened. Its small wounds heal easily & promptly without fear of any serious consequences. It prepares, facilitates, and simplifies all subsequent operations, even winter pruning. Nevertheless, pinching off, almost as indispensable as pruning, requires nearly as much good judgment, intelligence, & knowledge. Woe to a tree in the hands of a mindless gardener! It will meet much the same fate as it would have in the hands of the Scythian philosopher in the fable*.

ARTICLE VIII.. *On the Second Training.*

WHEN branches preserved at the time of pinching off have grown sufficiently long so that there's a concern that they might be broken by the wind or become misshapen (they'd be in that condition earlier or later in June depending on how far along the season has advanced), they have to be extended, separated, oriented, and fastened with *loquettes* [*Translator's note:* see p. 0100] or small marsh reeds, & not with wicker that could bruise & damage them.

But this training, requiring the same care for the orientation & arrangement of the branches as described for the training that follows pruning, should be preceded by further inspection of the tree's condition.

**Translator's note:* In the fable by Jean de La Fontaine (1621-1695), a philosopher from ancient Scythia visits Greece. He meets a wise gardener who introduces him to the value of careful pruning, but upon his return to Scythia he indiscriminately hacks his own trees to pieces and destroys them all. The storyteller uses this example to caution against the Stoic philosophers who would at once do away with feelings and emotions, the good along with the bad, and thus "make us cease to live before we die".

Often there are superfluous branches that escape being pinched off. In the case of young & vigorous trees, it's appropriate to leave some of these behind to consume excess sap. By then some branches previously thought to be good will have degenerated. Since the pinching off, new ones will have developed on the current year's branches as well as on the former ones. So it's necessary to perform a sort of supplement to the pinching off.

1°. Superfluous branches that escaped pinching off, & those that subsequently arose on the last pruning or on former ones are treated the same way as during the pinching off.

2°. Useless shoots that had to be left behind because the tree was excessively vigorous are treated based on the tree's present condition. If it's slowing down, they're cut off; if not, they're still retained, provided that they don't create too much clutter.

3°. Branches that look as though they're stunted are cut or pinched off above the first bud if a branch is needed at that location. Sucker growths also are disposed of, unless cutting them off would harm their neighbors. In that case appropriate means are used to moderate their growth.

4°. If one of the new branches gets to be too strong, some of the small branches that it has already produced are pinched off, saving the best-looking & best-situated of the lowest ones. There are two advantages to doing this. First of all, the branch exposed to sunlight & stripped of some of its leaves that would have contributed to its continued growth will transpire, harden, & moderate. Secondly, if it appears to be too strong at the winter pruning & it would be preferable to prune its branches, they'll be ready for this treatment. When such branches that are too vigorous are at the top of the tree, there must be no hesitation to cut them back to the lowest ones growing out of them.

In a word, this inspection, & all the ones that are worthwhile

doing from time to time until September are merely a sort of continuation or extension of pinching off. They should be performed with the same care & conform to the same rules. So without repeating myself further, I'll simply add that toward the end of July or the beginning of August a new training needs to be done; that sometimes the tidiness of the tree as much as its usefulness requires yet another one in September; that in general every time a branch is noticed that's at risk if it's not supported, it should be trained; that every branch that has acquired some solidity ought to be cut & not pinched off, lest it take with it a large piece of the branch from which it originates; that it should be cut very closely & gently so as not to disturb the nearby fruit; that the training determines the order, position, & direction of the shoots, just as pinching off determines their number; that this number ought to be such that the tree can situate & extend itself easily & can nourish itself amply but not excessively; finally, in seeing to it that the fruit gets the benefit of the air, that it should be kept partly shaded by leaves where transpiring less, it will grow larger & will be exposed to the sun's rays only shortly before being picked, as will be discussed below.

CHAPTER V.

On Diseases & Fruit Tree Pests.

TREES, like animals, are prone to debility and disease and are exposed to a variety of pests as they go through different stages of life. The principal diseases of fruit trees are cankers, gummosis, blight or blast, mildew, chlorosis, &c. Their most formidable pests are white grubs, aphids, ants, cockchafers, pear lace bugs, vine grubs, snails, dormice, &c.

ARTICLE I. *On Diseases of Trees.*

1°. SAP contaminated by polluted water or by excess manure will rupture cellular tissue at several places, spread between the wood and bark, and detach them from each other. It festers there more and more and oozes out like a sanies with an acrid & corrosive property that spreads and transmits the damage to nearby parts of the tree giving the name *canker* to this disease. If only small branches are afflicted, they're cut off. If it appears on the trunk or on some of the large branches, the cankerous portion is removed by an incision up as far as the living tissue that is covered up with cow dung or with rich soil. If water or manure are the sources of the disease (it sometimes can be brought on for other reasons), these sources are eliminated and the soil around the roots is refreshed, allowing the water to run off. But if the disease has progressed & has spread extensively over the trunk, the tree is lost.

2°. When the sap of stone fruit trees itself extrudes,

it produces *gummosis* that often doesn't cause them any harm. But when this extruded sap gets into the lymphatic vessels, it results in dangerous obstructions. Loss or deterioration of the part above this gummy deposit indicates that prompt treatment is necessary. This is easy when the disease has affected only the branches; they're cut off to about an inch below the deposit. But if it has attacked the trunk, it can't be cured.

3°. *Peach leaf curl* is a specific disease of leaves of the peach tree. In the spring they become wrinkled, distorted, and shrivel up. Their tissue thickens, the surface appears granular & scabby, and their color turns a mixture of whitish, yellow, and red. The disease attacks not only the leaves that clump into hairy tufts, but the ends of the shoots as well that swell up considerably & take on the same coloration. This disorder comes on in a few days, & soon it's followed by another one. A horde of aphids settles into the swellings or into the hollows of the leaves & attracts ants. The outcome is that all of the products of the tree, its shoots, leaves, & fruit, are disfigured & suffer greatly from this complex of ills.

Gardeners attribute peach leaf curl to reddening winds, but this term needs to be explained [*Translator's note: vents roux* is an agricultural term for cold, dry winds that blow from the north in the spring and turn young plants a russet or brown color]. Others claim that it's brought on by the first rays of clear & warm sunshine after a cold dew. If espalier peach trees facing west were free from peach leaf curl, this would seem reasonable. But sometimes they're struck by it, even though the dew had vanished & the air was warm for a long time before the sun reached them in this exposure. Aphids & ants also are blamed, but none are visible during the first days. Besides, the disease is too sudden & its progress is too rapid to be attributed to these insects alone. In fifteen days or three weeks the withered leaves drop off by themselves & the tips of the damaged shoots

dry up. But it's better to forestall this stage by cutting off the entire enlarged portion of the shoot & removing all of the leaves as soon as they appear to be affected. Keep only those needed to shelter the fruit until the tree grows new ones, & burn or discard the others in water to destroy the insects. With this effort the tree is freed of the diseased parts that debilitate it, & breeding of the aphids, or at least their proliferation, is prevented.

4°. There is another disease that M. de Combes describes very well: " it is incurable", he says, "and so far it has no specific name. All of the tree's branches, its leaves, and even its fruit, become black & sticky. It's a kind of contagious mildew that's transmitted to everything around it. Care must be taken to pull up the tree as soon as it's afflicted and to coat with lime the wall that, in a manner of speaking, has contracted the disease and blackens just like the tree. If you don't, all of the plants on your espalier will die one after the other. I'm unable to say what the source of this infection is. The common view that it's a bug doesn't seem likely to me. If there is one somewhere, it's combined with some other cause: a malevolent mist that prevails in one place rather than in another, a gust of contaminated air, some unhealthy characteristic within the tree itself, or lastly, scorching by the sun after a fog. [*Translator's note*: the germ theory of infectious disease, developed by Pasteur and Koch, came more than a century later.] Regardless of its cause, the disease is a certainty, & since it's absolutely incurable, one must be content to arrest its progress by promptly sacrificing the sick tree". This disease is not at all unique to peach trees. Vines, plum, apricot, & even apple trees are by no means free of it. I've seen it appear on a south-facing espalier vine branch. In two months it spread extensively on one side of the vine, & on the other side it overran three lattice squares of the trellis, & got as far as

the tip of a peach tree branch. After I halted it by cutting off the affected branches of the vine & the peach tree & covering the lattice squares of the infected trellis with two coats of oil paint, it never came back on that espalier.

5°. The leaves & the tips of new shoots on peach trees sometimes get covered with a sort of white powder that I believe is caused by an excessively thick & misdirected extrusion of sap. This disease, quite different from mildew or leaf scorching that causes white spots on leaves, greatly debilitates the tree & its fruit. Amputation of all of the diseased parts is the quickest remedy, if indeed it is a remedy. If the shortened branches don't produce any more healthy ones, there's no hope for the life of the tree. Its failing strength henceforth will be unable to resist subsequent outbreaks of this disease that ordinarily lasts three years. Some view cutting off the diseased parts as harmful to the tree. Instead, they dig a small circular trench around its base & from time to time empty into it a couple of pails of water in which they've diluted or soaked horse or sheep manure & other fresh fertilizer. They claim that this is a supreme remedy. Others claim that water alone is enough to restore trees afflicted by this disease.

6°. Sometimes shoots & leaves don't reach their normal size. If the tree signaling this danger by its decline & deterioration is not rescued, the leaves will turn yellow and fall off prematurely. The illness stems from adulteration of fluids, dryness, too much moisture, depletion of the soil, rotting of some of the large roots, cockchafer grubs, red ants, &c. The first cause is hard to eliminate. Mere recognition of the others indicates the remedies. Empty several pails of water around the foot of the tree from time to time; a trench will prevent the water from flooding the roots too much.

Supply some good, fresh soil; cut away the rotted roots; destroy the grubs & the ants; clean or shorten the chewed or moldy roots & replenish them with fresh earth. These are the most effective ways of restoring the tree.

7°. In loose & sandy soil, the trunk or some branches of trees planted on an espalier facing south sometimes get dried out or badly damaged by the intense heat of the sun. A batten or a large straw mat protects the trunk from this misfortune. Often scorching by the sun rots the side of peaches affected by it and gives the whole fruit an unpleasant bitterness. This is a rare problem if they're only exposed at the time that they ripen.

8°. I won't discuss at all sudden losses brought on by the sun, thunderstorms, cankerous ulcers that are concealed underneath the swelling at a graft union or that are spread out on the roots, &c., because there are no remedies at all for these. In the end, trees go through old age & decline, & their lifetime is limited.

Article II. *On Tree Pests.*

1°. Large white grubs that turn into cockchafers or other scarab beetles chew the bark off the roots of young trees. The best remedy is to dig them up with one's foot and destroy them. But since they've done their damage around the beginning of spring before they metamorphose, it's too late too look for them after the deterioration or the death of the trees reveals their injuries. Manure attracts these grubs, and putting it down next to the roots must be avoided. Or else take care to uncover the roots and check on them in January or February.

2°. The aphid is one of the most formidable peach tree pests. This viviparous insect multiplies almost from the moment it's born,

& its fecundity is prodigious. Destroying the first aphids that appear on a tree eliminates the very active & numerous progeny that are very difficult to eradicate later. Nevertheless, a lot of them can be killed by pressing those leaves already infested with them between two sponges steeped in a strong decoction of tobacco (powdered tobacco spread on aphids kills them instantly). Or use quicklime in water or a solution of soap in water (all oily substances are destructive to insects, but they also harm trees - apparently they block their pores) or a decoction of tobacco, of chimney soot, of sage, of hyssop, of wormwood & other very strong & bitter plants, boiled in ordinary water down to half the volume. Or strip off the leaves & the tips of the shoots & throw them into water or into the fire. Some gardeners blame this cutting back for generating the growth of a lot of weak branches.

3°. Ants, according to M. de Réaumur, are attracted by the sweetened excrement of aphids. Despite the reputation of this distinguished naturalist, I believe that it's still questionable whether it's the aphids or the ants that are involved. I actually had rid a tree of ants, and they attacked a nearby tree. From the next day on, its most tender leaves began to curl up. The veins contracted and recesses formed along this large blockage. The disease progressed for five or six days without my having been able to detect a single aphid. In the end I found a few, & in a short while their number grew considerably. I also noticed that the aphids didn't last long on trees from which the ants had been dislodged; that ants attack fruit with very thin skin, like *violette* peaches & early peaches, when they're ripe, or they take advantage of holes left by other creatures. They feed on them

& disregard the aphids or leave them behind, and they soon disappear. I've seen this happen several times. It leads me to believe that the ants prepare places for the aphids in the recesses that they make in the leaves & perhaps some food for them in the host of tiny wounds made by their bites into the epidermis & the parenchyma of the leaves. Subsequently the aphids take up residence there, & according to M. de Réaumur, treat the ants to their excrement. Whatever the case, I regard aphids as less dangerous pests than ants that considerably debilitate a tree & even kill it if they persist in attacking it for several years in succession. They have to be knocked down by shaking the branches. Subsequently, the tree trunk must be enveloped with wool or with cotton soaked in oil of aspic, in olive oil, or even better in cade oil, or with a wax container molded around the trunk and filled up with water. If it's an espalier tree, detach the branches & keep it away from the trellis. Or cut off the tender leaves & the tips of the shoots, because ants & aphids don't settle on trained wood or on firm leaves. Alternatively, spread a few drops of cade oil on the trunk and on the parts of the tree most frequented by the ants. I've noticed that this oil sometimes gets rid of them almost immediately & they don't come back, but it's often ineffective.

These expedients, & all of the others that can be used to drive these insects off, at least free the tree of the pests & give it a chance to recover from its losses. But it's to the detriment of the neighboring tree that soon enough gets attacked. So methods that actually destroy the insects are preferable, such as finding the ant nest and stopping up its entrance if it's in a wall or pouring boiling water on it if it's in the ground or under rocks. During the heat of the day, place a half skinned ox foot at the base of each tree,

& a handful of moss with honey or some syrup poured on it. Throw the bait into water when a large number of ants have gathered on it. Other traps include a container filled with honeyed water, &c. This contest requires less force than it does perseverance in the pursuit of these pests. Its care can be entrusted to a child; if he doesn't exterminate them, he'll at least reduce their number considerably.

4°. Common caterpillars, furry caterpillars, & cockchafers sometimes devour all the leaves on the trees & even attack its fruit. Destroying them is the only remedy. Soap dissolved in water kills caterpillars. Many of them can be squashed or burned when they congregate in bunches on the trees at sunrise.

5°. Vine grubs & the small green caterpillars that chew up buds & flowers deserve the same treatment.

6°. Pear lace bugs are small winged insects with gray, brown, and purple &c. spots that eat the parenchyma of pear tree leaves, especially those of the winter Bartlett pear on south-facing espaliers. I don't know any drug strong enough to repel or to kill them. When the leaves have fallen, they have to be burned & the bark of the tree scraped or rubbed hard to remove their spawn.

7°. Snails & slugs are fond of strawberries & peaches. They have to be caught by surprise in the evening & in the morning, or after a light rain when they set out for the day & when they retire for the night. A horsehair rope stretched along an espalier so that it's always in contact with the ground & circles around the base of each tree creates a barrier that they rarely dare to cross. They're afraid to injure their delicate bellies on the rough bristly hair.

8°. The bug that we're talking about here, very different from the insect that goes by the same name, is identical to the orange tree bug

Coccus citri. Fn. 722. *Pediculus clypeatus.* Linn. or differs very little from it. It's a scale bug with a body covered by a skin or thin shell & full of a whitish fluid. The ventral view under the microscope reveals that the insect has six small legs & two horns. The young move about & change their locations. They soon settle down & attach themselves firmly to the leaves & to the bark of the tree by means of very slender threads that originate from the inside edges of the shell. In this state they go through their entire growth, lay their eggs, & then die. The bug's shell dries up and hardens, covering the eggs & a white powder converted from the fluid that previously had filled its body. The eggs hatch at the end of May & in June, & most of the young have settled down by August or even sooner. Ants follow on after the bugs. Their excrement blackens the leaves, branches, & even the fruit and makes them look most unpleasant. To get rid of them, scrape off the affected branches with the back of a knife or rub them with a rough cloth or a brush during the winter or at the beginning of spring before the eggs hatch. Perhaps it would be even better to do it as early as the autumn before the bugs have laid their eggs. Wet the brush in water with some ox gall diluted in it. I've freed orange trees of scale bugs by wetting their tops in a tub of this solution.

9°. Wasps do a lot of damage to fruit. To cut down their numbers, all the nests that can be found must be destroyed during the night by fire or with boiling water. Or place a pot smeared with honey, or filled with sweetened water, near the trees.

10°. The usual defenses against dormice, rats, mice, &c., consist of all kinds of traps, a figure 4 [*Translator's note*: a trap made by suspending a board or a stone on three sticks put together in the shape of a figure 4], mousetraps, rat traps, and poisoned bait set out with customary precautions. But if one waits until the fruit is ripe,

the animals will prefer it to all of the other baits that thus will be useless.

11°. Birds are killed by gunshot, caught by bird lime, and kept away by scarecrows.

Hail is a scourge for which there is no remedy at all. Branches struck by it must be cut back to below the damaged part, because the bruises degenerate into cankers.

During the summer, water the tops of trees, even those out in the open, with a small pump. This is a very good practice. If the water is directed against the undersides of the leaves, a lot of insects that hide there will be killed, as well as their spawn or their young that they've deposited there.

CHAPTER VI.

Time & Method for Exposing, Gathering, & Storing Fruit.

I. MOST fruits need direct sunlight, both for improving their juice & their aroma and to take on the color that makes them appealing to the eye. Exposing them as soon as the shoots are pinched off would spare any further effort. But the tree could suffer from it, beyond having a large number of leaves cut off. Some of the fruit, exposed to the heat of the sun, would become scorched and fall off. Others would grow to a much smaller size than they would in the shade of the leaves where their delicate skin that transpires easily would stretch and yield to the expanding flesh. So when the shoots are pinched off, it's sufficient just to protect the fruit from etiolation by giving them the benefit of air without depriving them of the shade necessary for their preservation & favorable to their growth.

Expose them when they're full grown, or better, when their skin color brightens indicating that they're about to ripen. At first some of the leaves on one side of the fruit are removed, not by tearing them off but by cutting their stalks. Several days later, some of the ones on the other side are cut off. Finally, after a similar interval, all the rest that still provide shade are cut off. As a result, in six or eight days the fruit is entirely exposed. By dividing up the operation & performing it gradually, the fruit gets accustomed to the sun's rays a little at a time and runs less of a risk of getting badly scorched. In a few days it will take on color. This can be enhanced by passing a paintbrush dipped in fresh water over the skin on the side where the sun strikes it. Ordinarily this exposure is done only for peaches, apricots, & some kinds of pears that need to develop color.

II. Some fruits should ripen entirely on the tree. These include all of the stone fruits, all red fruit, & figs. Their color for some, fragrance for others, the ease with which some detach from the branch or from their stem, &c., are signs that they are ripe. A little experience is a better teacher for determining this than all of the indications that we could list. But the thumb is a harmful judge. The bruises that it makes soon cause rot & often give the entire fruit an unpleasant taste. All fruit, especially fragrant ones, are much better after having been in a cool place for at least a few hours than they are coming right off the tree.

Some fruits are best picked shortly before they ripen. For example, pears that tend to become soft or mealy. They reach that stage less quickly when they ripen more slowly & gradually in a fruit loft than they do on the tree.

Lastly, late pears & apples, the only resources

for late in the season, don't ripen until long after they've been picked. They're left on the tree until the first frosts at the end of September or the beginning of October require that they be covered. Fruit damaged by frost loses its flavor & spoils quickly. Those picked too early fade & attain neither the normal ripeness nor the flavor expected for them. Pears are more sensitive than are apples to these early cold spells; Apy apples [*Translator's note:* a small red and white firm, sweet apple named for Claudius Appius who introduced them to Rome] usually can stay on the trees until November.

The fruit loft should be in a dry place, sufficiently well located, constructed, and closed up around the door and window frames that neither frost nor moisture, the two great enemies of fruit, can get inside, & that rats & mice won't find any passage or refuge there. The stoves found in some fruit lofts protect them from frost and moisture, but the heat that they put out promotes ripening of the fruit & shortens the time that it takes. The inside perimeter should be furnished with one or with several rows of shelves or boards that have a wooden rod at the edge to hold the fruit. The center can be occupied by tables or by similar shelves. (Cupboards that close tightly would be preferable to shelves). Some cover the boards with paper, others with straw, very dry moss, &c. Others leave them bare. On shelves for apples, some spread out elder blossoms so that they acquire their fragrance, since they readily take on the scent of straw, wood, & everything fragrant on which they're left for a long time.

After the fruit has been harvested in good weather, it's brought into the fruit loft. The fruits are arranged so that they don't touch each other. Each type is placed separately. Pears are set down on their eye because signs of ripening first appear on the other end that must be visible.

The paper in which some wrap each one of their most beautiful & most precious fruit can help preserve them. After the last fruits have been put in, the fruit loft is not opened except during the middle of the day, & only when the weather is fine and dry. As soon as the weather turns raw and nasty, it's kept tightly closed. However, it's visited frequently both to inspect the condition of the fruit and to remove any spoiled ones that could spread the rot to their neighbors.

November is the time for tilling the planting beds of espalier trees. If it's suspected that the decline of a tree is due to deficiency or depletion of the soil, a trench three or four feet wide and deep enough to reach the roots is dug a foot or two away from the base of the tree. It's filled with good fresh earth, & the spent earth that had been dug up is moved elsewhere. If there's no good earth within reach, the trench must not be dug as deep so that the roots aren't exposed. Fill it with manure that's rotting but that isn't reduced to compost. Use horse manure if the ground is cold & hard, or cow manure if it's loose. Leave the trench open & the manure exposed until about mid-February, when it's covered with the soil that had been dug out of the trench. The following November the ground is tilled deeply to mix the soil up with the manure, that by that time will have been used up.

Some gardeners reject manure as being harmful to trees and to the quality of their fruit. Saplings that can't have depleted the soil in which they were planted definitely should not be manured unless the soil is very bad. In that case they shouldn't have been planted there in the first place. Even with the help of fertilizer they never will succeed well. Manure likewise is useless & even could be harmful to trees

that grow vigorously and nourish their fruit well. But when the trees have been restrained, it's good to sustain them with some fertilizer. When their produce shows signs of deterioration or failure, they have to be manured to revive them and to give them more ample nourishment without fear that the quality of the fruit will be impaired as a result. Because 1°. the fruit of every weak, sick, or declining tree is of poor or mediocre quality. As a consequence, everything that can contribute to the restoration of the tree also contributes to restoring the quality of its fruit. 2°. With most fruit, & several in particular like peaches, plums, and cherries, the larger they are relative to the size of their species or variety, the better they are, provided that it isn't a result of excessive moisture in the ground. If a small apricot grown in the open is preferable to a large one on an espalier, it's not because it's small, but rather because the difference in quality between growing in the open & on espalier is more noticeable in this fruit than in any other. 3°. Lastly, the practice of most expert growers, validated by their success, leaves no room for doubt that if good soil is lacking, manure is beneficial for the trees.

These are the general principles for raising, managing, & cultivating fruit trees. But they all don't have the same constitution, & there are some that require different rules. The descriptions that we'll give for the species and varieties of each kind of tree will be followed by appropriate specifics for its cultivation. If a certain variety requires special treatment, it will be noted following its description.

AMYGDALUS,

ALMOND TREE.

GENERAL DESCRIPTION.

THERE are few fruit trees that grow taller & straighter than the almond tree, even in our northern provinces where it seems to be foreign. When it's young it has an attractive shape, but it loses that long before it gets old. If it's not maintained by pruning, some of the branches droop & lose their consistency.

The shoots are straight, quite long & vigorous, rounded, smooth, green on the shaded side and red on the side facing the sun.

The leaves are attached alternately on the branch by very thin stems about an inch long. They are narrow, elongated, pointed at both ends, and divided lengthwise by a very prominent midrib with barely noticeable alternating veins extending from both sides of it. The leaves are uniformly & finely toothed along the edges and are held firmly on their stems. They don't wrinkle, fold, or turn in different directions. They're vivid green, and they persist until the hard frosts arrive. When the winters are mild, some of them survive until the new ones appear.

From one to three, & sometimes four, buds emerge below the axilla of each leaf. Some are fruiting buds, others are vegetative. The latter are smaller & less rounded than the fruiting ones. They both are encased in several scaly coverings.

The outer ones are small & somewhat cartilaginous; the inner ones are large, white, and membranous. The vegetative buds contain leaves that are folded in half before they develop & are held against each other side by side. Each of the fruiting buds contains a flower.

The flower of the almond tree is made up of: 1°. a concave cup-like calyx divided at the edge into five sections hollowed out spoon-like & culminating in a point. The side of the calyx exposed to the sun & the outsides of the sections are tinged with red. The inside of the calyx is bright yellow, & its points are bent outward. 2°. five petals like a rose are attached by a small unguis to the inside of the calyx between the notches formed by its indentations. They are six to eight *lignes* long & four to six *lignes* wide, depending on the variety of the almond tree, ending in a point toward the calyx. The other end is broad with a heart-shaped cleft. When they emerge from the calyx, the tips are strongly tinged with red on the outside. But after the flower opens, the red washes out, it largely clears up, & usually only a faint trace remains. The rest of the petal is white. A line or vein runs along it lengthwise & in this way divides it into two equal sections. 3°. from twenty to thirty stamens are attached to the inside margin of the tube of the calyx, between the membranes that form them & the bright yellow membrane covering the interior. The latter is irregularly pleated with elevations that form the roots, or bases of the filaments. The stamens are grouped in fours or fives between each section of the calyx. They're very uneven in length; some are more than six *lignes*, others are barely two. The filaments are bright red at the end attached to the calyx, which makes the whole bottom of the flower appear to take on that color. The other end is white,

culminating in a lemon-yellow tip formed by two olive-shaped capsules that contain a very fine powder of ovoid particles. When they open up, they look like the caps of certain mushrooms. 4°. The center of the flower contains a pistil consisting of a conical downy ovary & a cylindrical style six to eight *lignes* long crowned by a yellow hemispherical stigma. When the ovary enlarges & the fruit is set, the calyx detaches from the stem & falls off. It's then apparent that it was perforated at the bottom. The almond flower is hermaphroditic, and it contains all the essential components for fruiting. Its fruit appears sooner than that of any other fruit tree, between the beginning of February and the beginning of March, depending on how long the rigors of the winter have lasted.

The ovary becomes an ovoid fruit, bigger next to the stem than at its other end, flattened around the middle and fastened to the branch by its short & very secure stem. The skin, quite thickly covered with very fine hair or down, surrounds the flesh, or rather a husk, about one *ligne* thick, that is hard, dry, bitter, or tasteless. Inside the husk there is a woody pit that has the same shape as the fruit and is flattened on the sides. One of its edges is rounded and the other edge has a prominent ridge that extends from one end to the other and terminates in a point. It's slightly hollowed at the end where the stalk was inserted. The pit consists of two parallel plates separated by a diploe along its entire length. The outer shell is perforated by irregular holes. It opens into two parts lengthwise along the ridge that runs along one edge & a small groove along the opposite edge. Inside the pit is an almond with brown skin & with several large fibers running lengthwise. It contains two white lobes & a germ. This almond is the only edible part of the fruit.

When the description of this tree is compared with that of the peach tree, especially with respect to the fruiting parts, there are so many similarities that several botanists have included both of the trees under the same name *Amygdalus*. But in this work we have no intention of assigning a precise classification or natural family to each tree. Rather we intend to point out the principal features that distinguish one tree from another and the varieties of a species. So we have retained the individual names for the peach & for the almond tree, with the visible distinctions in mind that keep them from being confused. The almond tree actually is bigger & livelier than the peach tree; it sustains & nourishes its branches better. The leaves differ in size, proportion, color, the petioles, the prominence of the veins & the depth of the corresponding furrows. The almond's flowers bloom long before those of the peach; they have larger petals that differ in color & shape. Lastly, the fruit of the almond tree is very different from that of the peach tree. Its skin is never colored, and it's shaped differently. Its flesh is quite thin and unpleasant to the taste, whereas that of the peach is substantial & delicious. Its pit is perforated only by a few holes & is lightly indented with shallow grooves, in contrast to that of the peach that is coarse & deeply roughened. Its kernel, the almond, is used for food even though it’s bitter, while that of the peach is not used at all, &c.

SPECIES AND VARIETIES

I. *Sweet ALMOND, smaller fruit.* C.B.P. 441. [*Translator’s note*: Caspar Bauhin Pinax, 1560-1624, was an early describer of the tree.]

ALMOND TREE with small fruit. Common ALMOND TREE.

Since all bona fide almond trees have the same habit, or show no distinct difference, I won’t go over its description.

This one's flower is fourteen *lignes* in diameter. The petals are six & a half *lignes* long & slightly less wide. The tips are heart-shaped but with just a small cleft. No other kind of cultivated almond tree has flower petals as wide in proportion to their length. The flower is almost all white. It frequently has six petals, & the calyx has six sections.

The leaves on the shoots are five to five-&-one-half inches long by one inch at their widest point. This is nearer to the stalk than it is to the other end that terminates in a uniform point. The end next to the stalk also is pointed, but less sharply. The stalks are eight to twelve *lignes* long. The leaves on the fruiting branches are only two or three inches long & nine or ten *lignes* wide; they're less pointed than those on the shoots.

The fruit is thirteen to fifteen *lignes* long, ten to twelve wide at its widest diameter & eight to nine at its small diameter. It decreases in size considerably & almost uniformly toward the tip that ends in a small stub formed by the remainder of the dried-up pistil. The more rounded side, i.e. the one describing the greater part of an ellipse, arises from a very prominent rib that extends from the tip to the stalk & that covers the ridge on the pit. The stalk that supports it is thick, round, smooth, green, two *lignes* long at most, and very wide at the end that inserts into the fruit. The skin is a whitish green and is covered with very thick down.

The pit is the same shape as the fruit, measuring about a *ligne*-&-a-half less in each dimension. It ends in a sharp point & contains a sweet almond with a pleasant taste.

This almond tree, the most common one in our gardens, is quite fertile. If propagated by seed planting, the almond trees

that arise from it usually produce fruit that is more elongated, diminished in size but rarely in taste. Customarily the almonds are planted only to grow stocks for grafting quality almond trees, peach trees, and some apricot trees.

II. *Sweet ALMOND, softer pit.* C.B.P. [*Translator's note*: Caspar Bauhin Pinax, 1560-1624, was an early describer of the tree].

ALMOND TREE, soft-shelled. ALMOND TREE, soft pit. Lady ALMOND TREE. (*Plate I.)*

The flowers of this almond tree are fifteen *lignes* in diameter. The petals are only five *lignes* wide by almost seven *lignes* long; their widest dimension is about half their length. The tip has a heart-shaped cleft that is deeper than the one in the preceding species; the ungues are bright red. The petals are white on the inside, except for the tip that has a slight flesh-colored tint. Some are entirely this color on the outside. This almond tree blooms later than the others. Its first leaves appear at the same time as the flowers, unlike the others where the flowers open before the leaves come out.

The leaves are only two to two-&-a-half inches long & nine or ten *lignes* wide, held upright by quite thick stalks seven to eight *lignes* long. Slightly larger ones are found on the shoots, & those on fruiting branches are a good deal smaller.

The fruit is fourteen to sixteen *lignes* long, from eleven to thirteen *lignes* wide at its large diameter & ten to eleven *lignes* at its small diameter. Its shape is more oval than that of the other almonds and diminishes less toward the tip. Although the more elliptical side is indented by a small groove

instead of being elevated, the pit has a sharp & very prominent ridge on this side. The stalk inserts into a shallow cavity bordered by several small folds.

The pit, like that of other almonds, consists of two parallel plates. The inside one is thin & quite firm. The outer plate is thicker, but it's sufficiently fragile that rubbing of the almonds against each other during a somewhat long shipment reduces it to a powder. This plate forms long after the inside plate. If the husk of the fruit is removed around mid-August, it's hardly noticeable & it comes off with it. It's this slow formation that keeps it from hardening. The pit contains a sweet almond.

This almond tree is one that most deserves cultivation, even though its flowers are somewhat prone to drop off. The older trees often produce fruit with a quite hard pit, but much less so than that of the common almond.

III. *Bitter ALMOND, softer pit.*

ALMOND TREE, soft pit & bitter almond.

This almond tree is a variety of the preceding one, differing from it only in the taste of the almond & by its flower that is fourteen to fifteen *lignes* in diameter. The flower looks more like that of the common almond tree than that of the lady almond tree, but it opens up at the same time as the flower of the latter.

IV. *Sweet ALMOND, smaller fruit, softer pit.*

ALMOND TREE with small fruit & soft pit. Sultana almond.

The principal difference between this almond tree & the lady almond is the smaller size of its fruit. It's common in Provence. Another species of almond tree is highly regarded there;

its fruit is called *pistachio almond*. It's about the size & shape of a pistachio, & consequently even smaller than the Sultana almond. The pit ends in a point; its material is extremely soft. The almond is firm & tastes good. The tree differs from other almond trees only in the small size of its fruit & leaves.

V. *Sweet ALMOND, larger fruit.*

ALMOND TREE with large fruit and a sweet almond, *(Pl. II.)*

This almond tree, which should be the most common one in our gardens, seems to be somewhat more vigorous than the others. Its shoots are stout & strong, green on the shaded side and reddish on the side toward the sun.

The flowers are beautiful & very large, eighteen *lignes* in diameter. The petals are about eight-&-one-half *lignes* long, six *lignes* wide, with a deep cleft at the tip and lightly ruffled along the edges, some folded or rolled up on the underside. They are completely white, though their tips are tinged a very bright carmine-red before they open. Many of the flowers have six petals & their calyx has six sections.

The leaves are two to two-&-one-half inches long by eight or nine *lignes* wide. They are very finely toothed, pointed at both ends, very sharply so at the end opposite the petiole. Some leaves on small fruiting branches are very long in proportion to their width, not more than five or six *lignes* wide by two inches nine *lignes* long. The end near the petiole is only slightly less wide. The other end terminates in a uniform point. The petiole is thin & six or seven *lignes* long.

The fruit is large; some are more than two inches

long, fourteen or fifteen *lignes* wide across the large diameter & twelve or thirteen *lignes* across the small diameter. The stem is short & thick and inserts into a recess that is often surrounded with folds. This end of the fruit is much fuller than the other one that terminates in a point or in a large conical protuberance. The side comprising the larger part of the ellipse is divided lengthwise by quite a deep groove. The stem rarely inserts into the center of the end of the fruit, but rather very much at an angle, almost on the side. The husk is a *ligne* thick, so the pit, having the same shape, is only about two *lignes* less in each dimension. Its material is hard; the ridge is barely discernible. It contains a large almond, firm & very good.

VI. *Bitter ALMOND, larger fruit.*

ALMOND TREE with large fruit and bitter almond,

This tree, that has a bitter almond, is a variety of the preceding one. It has two other varieties, one sweet, the other bitter that have fruit that is very large but much less elongated & almost round.

VII. *Bitter ALMOND.* C. B. Pin. [*Translator's note*: Caspar Bauhin Pinax, 1560-1624, was an early describer of the tree]

ALMOND TREE with bitter fruit.

I don't know if this is a variety of the common almond tree with sweet fruit (n°. 1). Its habit & foliage are quite similar, but the flower & the fruit are different:

1°. This one's flower is larger (fifteen or sixteen *lignes* in diameter). The petals aren't as wide in proportion to their length; they are heart-shaped with a deeper cleft. After they develop they retain a very slight tinge of red that is more conspicuous at the unguis.

2°. The fruit is much more elongated & terminates in a longer & sharper point. It's fifteen or sixteen *lignes* wide, eight or nine *lignes* thick at its large diameter & six or seven *lignes* at its small diameter.

One of its varieties differs in the fruit, which is much smaller in all dimensions. It's only an inch long, seven *lignes* thick at its large diameter & six *lignes* at its small diameter. The flower is considerably different. It's seventeen to eighteen *lignes* long, & the petals are quite narrow (five-&-one-half *lignes*) in proportion to their length (eight-&-one-half *lignes*). They are deeply cleft in a heart shape & lightly tinged with red on the unguis.

VIII. *Indian ALMOND TREE, dwarf.* H. R. Par.

Indian dwarf ALMOND TREE. *(Pl. III.)*

This small tree is rarely taller than two-&-one-half feet & its stems are at most the thickness of a little finger. They often die before reaching that size, & the tree renews itself by shoots & suckers that it puts out in large numbers.

Its shoots are straight & the leaves are arranged alternately. From one to five buds form under the axilla of each leaf, one of which is a vegetative bud. The stems are large and very prominent.

The leaves are field-green and pointed at both ends, but the widest point is much closer to the tip than to the stalk, in contrast to the leaves of all other almond trees. The denticulations are uniform, fine, very sharp, & quite deep. The large leaves on vigorous shoots are three or three-&-one-half inches long & ten to twelve *lignes* wide. The others are much smaller

& narrower relative to their length. The stalk, quite short and thick, extends the entire length of the leaf right up to the tip, in the form of a very prominent green-white midrib. The lateral veins are barely discernible, especially on small leaves.

The flowers consist of: 1°. a cup-like calyx divided into five sections with tips that end in a blunt point. The tube is two to three *lignes* long; its diameter at the notches of the sections is a *ligne*-&-a-half & about one *ligne* at its base, which is covered with several scales. It's made up of one or of several thin membranes that have visible lines or small buff-colored ridges formed by the filaments of the stamens that originate within it. The indentations are about a *ligne*-&-a-half long. 2°. five pink petals contracted more toward the tip than toward the calyx. They're six *lignes* long, two or two-&-a-half *lignes* wide, diminishing uniformly in width from the rounded tip down to the calyx where they're attached between the indentations. 3°. about twenty stamens with pale red filaments & yellow tips divided by a red line. They don't lie back scattered on the petals but stand upright together on the disc of the flower. 4°. a conical ovary surmounted by a style terminating in a stigma. The entire pistil is three or four *lignes* long. In April from one to four flowers & a shoot, with its first leaves developing at the same time as the flowers, emerge from the same node. This mingling of leaves and flowers bedecking all of its branches give this tree a delightful appearance at this season.

The fruit is small & rarely plentiful. It's an inch long, eight *lignes* wide, and five *lignes* thick. It comes to a point & also diminishes in size near the stem, which is very short. The husk is covered with a long, coarse, & thick reddish nap.

The pit, with the husk removed, is eleven *lignes* long, seven-&-one-half *lignes* wide, four *lignes* thick, swollen in the middle and flattened at the edges. The end to which the stem attaches terminates in a blunt point out of which emerge several grooves that are not very wide & deep and that extend only over this part of the fruit. Three larger ones extend along one whole side in place of the ridge that's found on ordinary almonds. The opposite end terminates in a very sharp point. The surface of the pit is neither rough nor perforated with holes, but is smooth. It contains a bitter almond seven *lignes* long, four-&-one-half *lignes* wide, and two-&-one-half *lignes* thick.

Because the fruit of this attractive tree has no practical use or is of little value on account of its small size & its bitterness, the tree has to be ranked with ornamental trees rather than with the fruit trees. But if it's put into a conservatory or a greenhouse to accelerate flowering, its flowers can be fertilized by a choice species of almond tree, and the seeds may give rise to dwarf almond trees with serviceable fruit.

It's readily propagated by seed planting, rooted suckers, & by grafting onto the common almond tree.

I won't describe the double-flowered dwarf almond tree at all because it never bears fruit, & furthermore it's uncertain whether it should be classified with the almond, peach, or plum trees.

I'm also leaving out the almond tree of the Levant with silvery or satiny leaves, as it only yields a small fruit with a bitter almond and it's not worthy of cultivation as a fruit tree.

IX. *ALMOND - PEACH*

ALMOND - PEACH TREE. Almond-Peach. (*Pl. IV.)*

This tree resembles the peach tree but the almond tree even more so. It's vigorous, grows up & bears fruit by itself in the open. In height & habit it looks like the almond trees.

The shoots are green.

The size & shape of the leaves are intermediate between those of peach & almond trees. They are smooth, narrow, whitish green, and very finely serrated on the edges.

The flowers are very large, almost white but very lightly tinged with red, looking more like those of the almond tree than those of the peach tree.

Two types of fruit are found on the same tree & often on the same branch. Some are large, round, divided along their length by a groove and very fleshy & succulent like a peach. Their skin & flesh are green. The juice is bitter; they're edible only in compotes. The others ones are large, elongated, and have only a hard dry husk that splits open like that of an almond when the fruit ripens around the end of October. Both kinds have a large pit that isn't at all rough like the one in a peach; it contains a sweet almond.

So most of the features of this tree are the same as those of the almond tree. It probably originated from an almond flower that had been fertilized by pollen from stamens of a peach flower.

C U L T I V A T I O N.

Almond trees are propagated by seeds germinated in sand. They are planted, cultivated, and managed

as explained above under General Cultivation of Fruit Trees. But seeds are not alike, & trees of different types, with large or small fruit, hard or soft pits, and sweet or bitter almonds can arise from seeds taken from the same tree. Consequently, the better quality kinds are propagated more reliably by bud shield grafting onto almond trees raised from seeds.

The almond tree likes soil that is loose & fairly deep. In hard, compact, & clayey soil, the least suitable kind for it & in which it takes root with greater difficulty than in any other, it's best to plant the seeds & to graft on location rather than to transplant it there from a nursery.

I've never seen almond trees on an espalier. Undoubtedly they would succeed very well there, & their fruit would ripen to a degree that it would rarely attain in our climate if it were left in the open. I've seen arbors covered with large fruit almond trees (n°.5), that yield a lot of fruit & that create a beautiful impression with their large flowers in springtime. Large ones are grown in the open in warm & well-exposed areas. They yield fruit that's plentiful & ripe enough to be put to the same uses as the almonds that come to us from Languedoc, Provence, Touraine, Barbary, Avignon, &c.

USES.

Almonds are used both for food & in medicine. In both cases, sweet almonds are used much more than bitter ones.

1°. Compotes are prepared in May from young almonds before the pits have become firm. Even if these compotes are only fair, at least they offer the pleasure of anticipating the first red fruit that will soon appear.

2°. Green almonds are eaten and enjoyed in July. Since the pits are still soft, the fruit is opened easily lengthwise & the almond is removed when it has a most pleasant freshness & flavor.

3°. Dried almonds are eaten during the winter. The Lady, Sultana, & Pistachio almonds are the best because their soft pits are broken open easily when squeezed between the thumb & index finger. Although sweet almonds are thought to be nutritious, they're eaten in small quantities by themselves & without any preparation. Some find that two or three bitter almonds are enjoyable, but they enervate those with weak and very sensitive dispositions.

4°. A white liqueur called *milk of almonds* is made from sweet almonds that are ground up & mixed with a sufficient quantity of water. It's used like dairy milk in soup, rice, pablum, coffee, &c. A little sugar, & if desired, some orange blossom is added. The almonds should be blanched. About four ounces are required for each pint of water.

5°. Dried almonds are roasted in an oven inside their shells. The slightly bitter skin then comes off easily & the almonds take on a more pleasant flavor rather like pralines. In Provence they're called *amandes torrades*.

6°. A variety of pantry foods are prepared from sweet almonds that are made tastier by blending them with some bitter almonds – cakes, biscuits, marzipans, macaroons, preserves, &c. They're also made into sugar-almonds, pralines, nougat, &c.

7°. Sweet almonds are used for making orgeat. They are a base for demulcents & a few bitter almonds are added to bring out the flavor.

8°. Almonds are stripped of their skin, which comes off easily when they're dipped in boiling water.

They're then pounded in mortars or even ground up in large hand-mills and finally put in a press to extract the oil. The oil of sweet almonds is used to relieve coughs & severe colic pain. That of bitter almonds is used externally to resolve tumors & for deafness. The residue of almonds left behind after the oil has been extracted makes a suitable paste for cleansing & soothing the skin.

Bitter almonds are intensely poisonous for most birds; the oil from sweet almonds is a very rapid and effective antidote.

Most of the dried almonds consumed in our climate are obtained from Genoa, Spain, & from our own southern provinces. Regardless of what they're used for, the rancid ones must be discarded.

ARMENIACA,

APRICOT TREE.

GENERAL DESCRIPTION.

THE APRICOT TREE is a tree of medium height that doesn't grow tall but spreads its branches widely.

Its shoots are strong & vigorous; they have smooth bark & usually are tinged with red on the side toward the sun. They have single, double, or triple buds, & in some types an even larger number are grouped on the same stem.

The leaves are attached alternately on the shoot by long, thin stalks that let them hang down. They're wide on the side where they open out, & they terminate in a point. They're shaped very much like those of the poplar tree. Their size, proportions, denticulation, &c. vary according to the type. Inside the bud they're folded in half. When they emerge, they're accompanied by fringed stipules that are often colored and that dry up & fall off before the leaves have reached full size.

The flowers are composed of: 1°. a calyx with a cup about two *lignes* high, rounded at the bottom, covered with bud scales, & attached to the branch by a small pedicel half a *ligne* long at most. The rim of the cup is about three *lignes* wide and divided into five sections each three *lignes* long and the same in width. They end in a blunt point, are hollowed out like a spoon & normally are bent back onto the cup.

The exterior of the calyx & its sections, except for the bottom of the cup, is dark red. The inside of the calyx is light green & the insides of its sections are part green, part red. 2°. five white petals arranged like a rose, six *lignes* wide, five *lignes* high, considerably hollowed or concave, rounded and often puckered at the edges. They're attached by a very small unguis to the inside margins of the calyx between the sections. 3°. from twenty to thirty stamens attached to the inner lining of the cup. Their tips are yellow, & their filaments, three to four *lignes* long, are white. They're held erect, gathered around the pistil at the center of the flower until the tips have deposited their pollen. 4°. a pistil with a white style capped by a stigma. The style is five to six *lignes* long and stands on a light green rounded ovary situated at the bottom of the calyx. The apricot tree's flowers blossom between mid-March and the beginning of April. They're identical in all varieties, or differ only a little more or less in size.

The ovary becomes a fleshy fruit, round or close to it. The fruit is divided lengthwise by a groove. It's covered by a thin, slightly fuzzy skin that adheres very tightly to the flesh. It's attached to the branch by an extremely short stalk. It contains a very woody pit that looks like shagreen and is flattened at the edges and raised on one side into three ridges. The middle one is the sharpest & most prominent. The pit contains a kernel made up of two lobes with the germ at the tip. The size & proportions of the fruit, the color of its skin, the flavor & consistency of its flesh, the taste of its kernel, the time that it ripens, &c. all vary according to the type of apricot tree.

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SPECIES AND VARIETIES.

I. *APRICOT TREE small fruit, round, part red, part golden-yellow, ripens prematurely.*

Early APRICOT. Musky early APRICOT. (*Pl. I.*)

The shoots of the early apricot tree are large, red on the side toward the sun, green on the shaded side. Around the time that they emerge, they are greenish and speckled with small gray spots.

The buds are large, elongated, pointed, triple along almost the entire length of the shoot, and not far apart from one another.

The leaves are a beautiful green, wide, concave or spoon-shaped, denticulate & bidenticulate, but not very deeply. They're about three-&-a-half inches wide and the same in length. The stalk is twelve to eighteen *lignes* long and dark red on the side exposed to the sun. The midrib & sometimes the lateral veins are lightly tinged with red. Some of the latter appear in alternate sequence, others are opposite. There are five or six principal ones on both sides of the midrib. They extend to the margins of the leaf where they form curved lines. They're very prominent on the outside of the leaf. On the inside they're indicated only by light green lines that have no depth. Since the sequence, number, orientation, &c. of these veins are the same for all kinds of apricot trees, we won't discuss them further.

The fruit is small and rounded across its diameter that is fifteen *lignes* by thirteen *lignes* in height. Good soil & and growing on an espalier sometimes bring about changes in its proportions & its volume. There are some that are seventeen *lignes* across the large diameter, fifteen *lignes* at the small diameter, & thirteen *lignes* high. A very distinct groove, though closed up & not very deep, divides one of its sides lengthwise. Its stalk,

about a *ligne*-&-a-half long, inserts into a narrow & deep cavity.

The skin is slightly bitter if the fruit has ripened under the leaves or off the tree. The shaded side is a beautiful yellow; the opposite side is quite a strong red.

The flesh is a not very deep yellow & separates from the pit.

The juice is quite plentiful. Some find that has a bit it of a musky taste.

The pit is six *lignes* long, seven *lignes* wide, & six *lignes* thick. Those of the large fruit varieties are an additional *ligne* in each dimension. It's much more enlarged on the side with the ridge is than on the opposite side, where it's barely two *lignes* thick. The kernel is bitter.

This apricot ripens at the beginning of July.

II. *APRICOT TREE small fruit, round, whitish, ripens prematurely.*

White APRICOT. APRICOT-Peach.

THIS apricot tree evidently is a variety of the preceding one; it's almost completely identical to it. Its buds are smaller & shorter, almost as wide at the base as they are high. The leaves aren't quite as big & their denticulation is less deep. They're not inwardly concave; rather they're folded along the central vein.

The shape of its fruit resembles that of the early apricot. It's small, flattened at the end where the stalk inserts, & even a little bit at the other end. It's quite round at its diameter that is fifteen to sixteen *lignes*, and it's thirteen or fourteen *lignes* high. The largest ones are eighteen *lignes* in diameter & fifteen *lignes* high.

The skin is covered with a fine down, more distinct than on other apricots but less so than on peaches. The shaded side

is a waxy white that yellows slightly toward the opposite side. The latter turns a light reddish-brown when exposed to the sun. The fruit that ripens under the leaves remains completely white.

The flesh is refined & delicate. It's white on the shaded side; on the other side it turns to a yellow that isn't quite as light as the skin.

The juice is plentiful, mild, not very flavorful; it tastes a little like a peach of average quality.

The pit clings to the flesh. It's eight *lignes* wide, seven *lignes* long, and six *lignes* thick. It's short, almost equally blunt at both ends, so it's elliptical around its diameter. The more enlarged side is edged with a very sharp ridge, along with two (sometimes four) others that are less prominent. The kernel is bitter.

It ripens together with, & frequently before, the musky apricot.

This apricot tree is cultivated more for its fruitfulness & its early ripening than for the quality of its fruit, that during cold & damp years rots on the tree instead of ripening.

III. *Common APRICOT TREE, large fruit.*
Large fruit APRICOT TREE, bitter kernel, Inst.

Common APRICOT. *(Pl. II.)*

The common apricot is very productive & grows to be the tallest of the apricot trees.

Its strong & vigorous shoots are red on the side toward the sun, green on the opposite side.

The buds are long, pointed, triple, & often more numerous than that at each node.

The leaves are large, a beautiful green, and quite deeply dentate. They are about four inches wide and equally long.

Growing the trees on an espalier as well as in the open seems to result in a greater variety of size, shape, & flavor in the fruit of this tree than in that of other apricot trees. 1°. In the open the fruit is smaller. The best ones rarely exceed twenty *lignes* at their large diameter, eighteen *lignes* at their small diameter, & nineteen *lignes* in height. They maintain a more uniform shape, their skin takes on more color, & they develop conspicuous brown spots that make them look mangy. The flesh turns a deep yellow, rendering them unfit for preserves, but their excellent flavor makes for choice eating. 2°. They grow larger on an espalier, but they're often elongated. The large diameter on some of them is twenty-five *lignes*, the small diameter twenty-three *lignes*, & they are twenty-six *lignes* long. They are attractive & shapely when the large diameter is twenty-five *lignes*, the small diameter is twenty-three *lignes*, & the length is twenty-four *lignes*. If they're not exposed when they're about to ripen, they acquire little color, the flesh is a bit mealy, & their juice isn't very flavorful. It can be seen from the proportions noted above that this apricot, whether on espalier or in the open, is flattened along its length. The lips at the edges of its groove are almost always unalike. The side that had been struck strongly by the sun takes on a deep red color, as though this side had been varnished with a coat of dragon's blood [*Translator's note*: a commercial extract from the resin of the dragon tree used for coloring varnish]. The other side is colored a beautiful deep yellow, & the flesh is more of an amber yellow than the skin.

The pit of the large long apricot from an espalier is twelve *lignes* long, six *lignes* thick, and eleven *lignes* wide. The side corresponding to the groove on the fruit is elevated into three sharp & very prominent ridges. It separates well from the flesh, except along middle ridge where a very thin strip remains behind. The kernel is bitter.

The first of its fruits on an espalier ripen at the same time as the last of the early apricots.

IV. *APRICOT TREE* small fruit, oblong, sweet kernel.

Angoumois apricot. (*Pl. III.*)

This apricot tree is not as large as the ones above.

Its shoots are slender, very long, brown, smooth & shiny. The bark of the old wood is covered with a whitish or ashy skin.

The buds are big, oval, and triple along the entire length of the shoot.

The leaves, that distinguish it clearly from all the other apricot trees, are small, finely & deeply denticulate, and hang from stalks fifteen to twenty *lignes* long. Both ends are pointed. More typically than the leaves of other apricot trees, they have two little ears on them when they open up. The leaves are three-and-a-quarter inches long & two inches two *lignes* wide. The ones at the ends of the shoots often are elliptical across their width like those of the common apricot tree, but they always are elongated at the end near the stalk.

The fruit is small and divided lengthwise by an indistinct groove. It's more noticeable by the irregular lips along its margins than by its depth. It ends in a small, flat area at the top of the fruit & at the other end in a deep & narrow recess where the stalk, about two *lignes* long, inserts. Its large diameter is fourteen to fifteen *lignes,* the small diameter from thirteen to fourteen *lignes*. Its height, sometimes smaller, sometimes larger, is most often equal to its large diameter. Regardless of its dimensions, its shape is usually oblong.

The skin is a beautiful deep red spotted with purple on the side toward the sun. On the shaded side it's reddish yellow.

The flesh is yellow, almost red, and juicy.

The juice is plentiful, wine-like, pleasant & very flavorful, occasionally sharpened by a little acidity.

The pit doesn't cling to the flesh at all. It's seven-&-a-half *lignes* long, seven *lignes* wide, & four-&-a-half *lignes* thick. Lying flat, it appears almost round. The kernel is sweet & good to eat, with a flavor like fresh hazelnut. The skin likewise has very little bitterness.

This apricot ripens about mid-July, before the common apricot.

V. *APRICOT TREE small fruit, round, sweet kernel, flavor reminiscent of almond & hazelnut at the same time.*

Holland APRICOT. Hazel-almond. (*Pl. IV.*)

The Holland apricot tree is smaller than the Angoumois apricot tree. It's very fruitful & rarely fails to produce, especially on an espalier & grafted onto the winter-cherry plum tree. When grafted onto the Saint-Julien plum tree, it yields less fruit, but larger ones.

The shoot is quite big, light red on the side toward the sun, green on the shaded side, and flecked with very small gray spots.

The buds are elongated, pointed, and triple along the entire length of the shoot.

Some of the leaves are as long as they are wide, two inches, ten *lignes.* But most are much longer than they are wide, three inches by two inches, four *lignes.* Almost all of them are divided unequally by the midrib. Their denticulation is fine and sharp like the teeth of a saw. They are suspended on stalks twelve to eighteen *lignes* long. Some of these are bright red; the others are green.

The fruit is small, almost perfectly round, fifteen *lignes* high by fourteen-&-a-half *lignes* in diameter. Once in a while there's one that has one side a little smaller than the other, or one with a small & a large diameter, but the difference is never very noticeable. The cavity where the stalk inserts is deep. The groove is well defined but not very deep. The lips along its margins are rarely dissimilar.

The skin is a beautiful yellow on the shaded side. On the other side it's strongly tinged with red & even on espalier, full of small conspicuous brown spots.

The flesh is deep yellow.

The juice is flavorful & excellent.

The pit is seven *lignes* long, the same width, & four-&-a-half *lignes* thick. The kernel is sweet & has a very pleasant hazelnut flavor, with an aftertaste of sweet almond.

This apricot, one of the very best, ripens on espalier shortly after mid-July.

VI. *APRICOT TREE small fruit, flattened, sweet kernel.*

Provence APRICOT. (*Pl. IV. Fig. P.*)

This apricot tree is about the same size as the one above. It's somewhat less fruitful.

The shoots are long, of medium thickness, very smooth, light red, but brighter on the side exposed to the sun, green on the shaded side, and very slightly spotted.

The buds are big, pointed, and triple. Some nodes have groups of four to eight of them together on the same stem.

The leaves are small and round, and terminate in quite a wide point that's always bent outward. They're two-and-a-third inches wide & two-&-a-half inches long.

The denticulation & bidenticulation is blunt & not very deep. The deep red stalks are eight to twelve *lignes* long.

The fruit is small and flattened. The biggest ones are fifteen *lignes* high, sixteen *lignes* wide, & fourteen *lignes* thick. A deep groove divides one of the sides, & one of the lips that borders it projects much more than the other one does.

The skin is yellow on the shady side. On the sunny side it's a beautiful bright red that intensifies on an espalier.

The flesh is a very deep yellow.

The juice is not very plentiful, but it has an enhanced flavor, wine-like & refined.

The pit is brown, rough or sandy. It's seven-&-a-half *lignes* long, six *lignes* wide, four-&-a-half *lignes* thick. It contains a sweet kernel.

The fruit ripens on an espalier in mid-July.

VII. *APRICOT TREE small fruit, rounded, golden yellow on one side, turning red on the other.*

Portugal APRICOT. (*Pl. V.*)

This tree is quite fruitful. It never reaches the size of the common apricot tree.

The shoots are quite substantial. They are reddish and heavily speckled with extremely small gray spots.

The buds are small, pointed, and triple. Often four to eight of them are grouped together on the same node.

The flowers are lightly tinted red. Many have six petals.

The leaves are small, elongated, very finely & not very deeply denticulated. When they open, they widen out much less than those of other apricot trees, except those on the Angoumois apricot tree. The tip ends in an almost uniform point. They are three inches long

& two inches three *lignes* wide. The stalk is six to twelve *lignes* long, & some of the veins are deep red.

The fruit is small, rounded, fifteen *lignes* in diameter & very slightly less than that in height. Often it's only thirteen *lignes* in diameter and equally high. The groove that divides it from head to tail is well defined though rarely deep, & the two lips bordering it are similar.

The skin is brittle, sometimes a little bitter. It's light yellow. The side toward the sun takes on very little color & accumulates several conspicuous small spots, some red and others brown.

The flesh is a not very deep yellow, refined, delicate, and adheres slightly to the pit.

The juice is plentiful and flavorful, which gives this apricot the reputation as being one of the best.

The pit is practically smooth, eight-&-a-half *lignes* long, seven *lignes* wide, and five *lignes* thick. The kernel is bitter.

This little apricot ripens about mid-August.

VIII. *APRICOT TREE small fruit, flattened, purple on one side, turning from golden yellow to red on the other side, sweet kernel.*

Violet APRICOT.

This apricot tree is thought to be a variety of the Angoumois apricot or of the Portugal apricot due to the color of its shoots & the shape of its leaves.

The fruit is small, at most eighteen *lignes* in height, eighteen *lignes* across its large diameter, & sixteen *lignes* at its small diameter.

The skin is red, verging on purple on the side toward the sun

& a reddish yellow, sometimes wood-colored, on the shaded side.

The flesh is yellow, tending to red, rather similar to that of the melons known as *red flesh.*

The juice is sugary, not very plentiful nor flavorful.

The pit adheres somewhat to the flesh; it's nine *lignes* long, eight *lignes* wide, and five *lignes* thick. Its material is soft & the kernel is sweet.

This apricot tree is cultivated more as a curiosity than for the quality of its fruit, that ripens at the beginning of August.

There's a small apricot tree cultivated at the Trianon that has longish, slender shoots that are green on the shaded side and violet on the other side. It has small leaves that are wide near the stalk and terminate almost like a plum tree leaf at the other end. They're a deeper green than those of any other apricot tree. The skin of its fruit is deep brown, almost black. The flesh is a very deep red-brown. This small fruit has a pleasant flavor. They call it *black apricot*.

IX. *APRICOT TREE small fruit, flattened, turning somewhat reddish from golden yellow on one side, becoming green on the other.*

Clingstone APRICOT. *Alberge* APRICOT.

This apricot tree grows as large as the common one. It fills out with more branches & succeeds better out in the open than on an espalier.

Its shoots are slender, smooth, almost completely red, with only very little green on the shaded side.

The buds are large and pointed. Most are single, borne on very prominent stems.

The leaves are small, wide next to the stalk & usually have two small ears when they open out. They come to a very long almost symmetrical point

that bends outward. The margins are deeply dentate & bidentate. They're three-and-a-quarter inches long & two inches eight *lignes* wide. Some are much wider in proportion to their length. The ten to fifteen *ligne* long petiole, part of the midrib, & even part of the small veins are tinged deep red.

The fruit is small, flattened along its length and somewhat smaller at the top. Generally the groove is barely detectable. The stalk inserts into a narrow & deep cavity. The fruit is fifteen *lignes* in height, a little less across its large diameter, & thirteen *lignes* across its small diameter. The largest ones are about a *ligne* more in each dimension.

The skin is a yellowish green when in the shade. The sunny side is a deep yellow wood color and is covered with very small reddish spots that look like large conspicuous points. Infrequently it takes on a bit of red color.

The flesh is very soft, practically melting in the mouth. It's a very deep reddish yellow.

The juice is plentiful. It has an accented wine-like flavor mingled with a slight bitterness that is not unpleasant.

The pit is large & flat, nine-&-a-half *lignes* long, nine *lignes* wide, and four-&-a-half *lignes* thick. In some regions it's not as big. The kernel is large, very full, & bitter.

It ripens in mid-August.

Because the clingstone apricot tree is customarily propagated by seed planting, there are some differences that appear in the leaves & in some parts of individual trees, but they aren't sufficient to establish distinct varieties. The most highly regarded of all of them is the clingstone apricot tree of Mongamet. It's claimed that it succeeds well only in this village & in the vicinity of Tours where clingstone apricot trees are very common.

X. *APRICOT TREE, largest fruit, flattened, tan on one side, becoming red on the other*.

Nancy APRICOT. (*Pl. VI.*)

This apricot tree is the same size as, or even surpasses, the common apricot tree.

The shoots are stout & strong, red on the side toward the sun, green on the other side, and highly speckled with gray spots. The red is deeper than on the shoots of the Holland & Provence apricot trees.

The buds are thick, short, very wide at the base, triple, and often clustered in groups of five or six fairly close to one another.

The leaves are large, wide, & more rounded near the stalk than those of the clingstone apricot tree. They terminate almost symmetrically in a long, narrow point. The denticulation on the margins is variable. On some leaves it's sharp & very deep; on others it's blunt & less deep. The leaves are from three inches nine *lignes* to four inches six *lignes* long & three inches to three inches nine *lignes* wide. The stalk, from twenty *lignes* to two inches long, is large and tinged a beautiful red. The leaves often have two small ears on them when they open up. They're a lighter green than those of the clingstone apricot tree, which they greatly resemble.

The fruit is much bigger than that of the common apricot tree. It's common to find them growing in the open to two inches eight *lignes* in height, the same across their large diameter, & twenty to twenty-four *lignes* across their small diameter. They have a flat shape that rarely is fixed & regular. Some are elliptical along their length. Others are much smaller at the top than at the other end. The latter are oval around their diameter but not from the top to the stalk. The former resemble an oval where the ends are neither at the top

and the stalk, nor in the middle, but located obliquely. The stalk is set into a round, narrow, and not very deep cavity. The groove generally penetrates only near the stalk. As it approaches the top, it fills in & becomes indistinguishable.

The skin on the shaded side is a tan yellow, often mingled with a bit of green when the tree is planted on an espalier. The side toward the sun is tan & takes on a bit of red.

The flesh is yellow, tending to red, very soft and juicy, becoming neither dry nor doughy when the fruit turns very ripe.

The juice is plentiful, flavorful, very pleasing to the taste, & unique to this apricot.

The pit is large, flat, rougher than that of the common apricot, and enlarged much more toward the side that's elevated into three very prominent ridges. The pit of the apricot with the dimensions that I've given above is fourteen *lignes* long, twelve *lignes* wide, and seven *lignes* thick. The kernel is bitter.

This apricot, that by its size and its excellent flavor deserves the top rating, ripens in mid-August. Some call it the *apricot-peach.*

We could add several other apricot trees, some of which are merely varieties that aren't very much different than those that we've described. One such is the apricot tree with variegated leaves, which is the only feature that distinguishes it from the common apricot tree. The others succeed poorly in our climate. An example is the Alexandria apricot tree whose flowers, too eager to herald the spring, are almost always ruined by frost. The result is that it very rarely yields its small, round, vividly colored, & extremely tasty fruit.

CULTIVATION.

1°. Seed planting propagates the clingstone apricot tree without variation and with very few differences. But seeds of all the other apricot trees rarely propagate true to type. Trees obtained from them usually have small leaves. Their fruit is not very plentiful & is diminished in size. It has a slightly bitter & natural taste that makes it more suitable for preserves than for being eaten fresh. But these trees make excellent stocks for grafting authentic apricot trees, peach trees, & plum trees.

2°. Apricot trees are cleft grafted onto plum trees, or better dormant bud grafted onto wild stock of the apricot or plum tree. The Nancy apricot tree succeeds very well on an almond tree. The Angoumois & the clingstone are grafted onto it as well, but the bud shield comes off easily.

3°. Apricot trees are grown in the open either as bush or as standard trees. If the fruit fails to reach full size, it will take on more color & a more enhanced flavor that makes it preferable for being eaten fresh. But in the open this tree often fails to bear fruit unless it's planted in a small walled garden, in a courtyard, or in some other sheltered place that's suitable for protecting its flowers from frost that often damages it when it's in a large garden or in an exposed area. To be certain of getting fruit every year, the apricot tree must be planted on an espalier. All exposures are suitable, even a northern one where the flowers open later and thus run fewer risks. The fruit, since it doesn't take on color there, is more suitable for making preserves where a light yellow or slightly amber color is desired. Nevertheless, the eastern and southern exposures are the most favorable.

4°. The apricot tree enjoys warm, loose, sandy, deep soil & accommodates to all kinds of terrain, especially when grafted to an apricot tree grown from the pit.

5°. Since this tree rarely takes on a uniform shape in open ground, it requires some pruning or simple trimming. On an espalier, it's pruned following the general rules. When the wood gets too old & the fruit deteriorates, it's a good idea to cut the tree back. It re-grows easily, rejuvenates, & renews itself.

USES.

Apricots are consumed fresh, in compotes, preserved whole, in quarters, as marmalade, in pies, as a brandy, &c. They're dried in an oven to be used in compotes during the winter. When the fruit has set too abundantly, some are removed before the pit has formed. Compotes are made out of them, though they aren't as good as those made from almonds. An extremely good ratafia is made from apricot kernels & even from the material of the pit.

B E R B E R I S,
B A R B E R R Y.

DESCRIPTION.

BARBERRY, of thornbushes, with red fruit.

Red Fruit BARBERRY.

THE BARBERRY is accused, unjustifiably I believe, by plowmen of spoiling the flowering of their wheat. It's even kept out of hedges that line their property and consigned to the woods & to enclosures with poor soil. But we owe the barberry a place in this treatise because of the uses for its fruit that is conserved as grain and in jelly, tarts, preserves, syrup, &c.

This shrub is very bushy & grows five or six feet tall.

The shoots are straight, long, stout, grooved, and have a tan color. The phloem is yellow.

The buds are covered with pink scales and are set alternately on the shoots. The stem is big & wide and terminates in three strong & very sharp spines. The largest one, six to eight *lignes* long, rises perpendicularly on the branch. The other two originate from the base of the large one. They make a right angle with it on each side, & intersect the branch horizontally. Some stems are armed with four or five spines arrayed like spokes in a semicircle.

Three to six leaves develop from each bud that opens in the spring. If it was a vegetative bud, a branch emerges from among them, or a cluster of flowers if it was a fruiting bud. Most commonly four leaves develop, two of which are small & are shaped almost like a racket. The other two, much larger, are about two inches long and an inch wide. They're pointed at the end next to the extremely short stalk. They widen quite uniformly up to their midpoint, & terminate almost ovally. The veins are few in number & are not very prominent. The margins are crenate rather than dentate, though not deeply so. Each tooth or crenation terminates in a tiny soft spine as fine as a small hair half a *ligne* long. These tiny spines & the entire margin of the leaf are lightly tinged with red. The leaves are thick, stiff, a bluish-green on the inside, light green, almost white on the outside, with a strong & unpleasant odor.

The flowers, that smell the same as the leaves, bloom at the beginning of May. They're arranged in clusters of from twelve to thirty blossoms; their stalk & pedicels are red & very slender. When completely spread open (because they normally open only halfway), they're about two-&-a-half *lignes* in diameter. They consist of: 1°. a calyx or perianth of six segments. Three are red & very small; the other three are two *lignes* long, one *ligne* wide, very much hollowed like a spoon and an extremely bright yellow. 2°. six petals two *lignes* long by a little more than a *ligne* wide, hollowed spoonlike, puckered at the edges and a pale yellow. On each side of the unguis there's a small deep yellow gland. 3°. six stamens that lie flat on the petals & emanate from their unguis. If that spot on the unguis is touched, the stamens move toward the pistil. Since the petals ordinarily follow the movement of the stamens, the flower closes up. 4°. a cylindrical light green pistil,

one *ligne* long, surmounted by a flattened stigma. The pistil becomes a berry or a fleshy fruit.

The fruit grows in clusters. It's cylindrical in shape, rounded at the ends, attached to the stem by a very slender stalk two to four *lignes* long. It terminates in a very prominent small, black hilum. It's flattened lengthwise, the diameter in one direction about a half *ligne* less than in the other.

The skin is hard, smooth, shiny, and a beautiful red bordering on purple when the fruit is extremely ripe.

The flesh is light red and very soft.

The juice is plentiful with a sharp, tart taste that is tempered & made quite pleasant by heating & adding sugar.

The seeds are long, very hard, light brown, black at both ends and have an acrid taste.

The fruit ripens around the beginning of November.

When this shrub is planted in a kitchen garden or in good soil, it grows taller and bushier & the fruit is bigger than when it's in hedges & in poor soil. It has clusters of more than thirty berries with most of them more than six *lignes* long & three *lignes* across their large diameter.

The seedless barberry, *Barberry without seed C. B. Pin.* [*Translator's note*: Caspar Bauhin Pinax, 1560-1624, an early describer of the tree] is the one that's most worthwhile cultivating. Botanists look upon it as a variety of the preceding one, even though it doesn't consistently retain its distinctive character. When one is transplanted into a kitchen garden, it puts out vigorous shoots, and produces beautiful fruit, but each berry has two seeds. Some years later when it's filled out & it's growing less vigorously, most of the berries have no more than one seed. Finally, when it starts to get old it yields fruit without seeds as it did before it had been transplanted. This variety is found in the forest of Lyons, in several places in the Vexin Normand, & in the vicinity of Rouen.

The seedless barberry preserves made in that town are extremely very well known. The common barberry shrubs in the vicinity of Paris & elsewhere don't yield any seedless fruit, even from the oldest plants.

The other barberry varieties, purple fruit, white fruit, large leaved, *Buxus*-leaved, &c. are cultivated more as curiosities than for their uses. But it's a shame that M. Tournefort left the black fruit barberry *Oriental Barberry, taller with sweetest black fruit Cor. Inst.* on the banks of the Euphrates & that he didn't enrich our locality with a tree that would seem to be so worthy of recognition.

The barberry doesn't require any cultivation, & pruning even less so. The more it's pruned, the less fruit it yields. It's propagated by seed planting, cuttings, and rooted suckers.

CERASUS,
CHERRY TREE.

GENERAL DESCRIPTION.

CHERRY TREE is a generic term common to a family that covers different species & varieties, all of which have the following properties:

1°. The trunk & branches of all cherry trees are covered with four layers of bark. The first one that covers all of the others is tough, strong, & firm. The second is also tough but thinner & not as hard as the first. The third is very thin, spongy, & has almost no body. The fibers in these three layers of bark are oriented transversely, circularly, or spirally. The fourth one is a white spongy material in which the fibers are oriented lengthwise along the branches.

2°. All cherry trees have three kinds of buds: vegetative buds, leaf buds, & fruiting buds. The vegetative buds are smaller & more pointed than the others & usually are located more or less at the tips of the branches that bear them, depending on the vigor of the tree. Since they're there only to propagate the branches, this is the only kind of bud found on a young tree. The leaf buds are a bit bigger & blunter than the vegetative buds. They're located all along young branches & mainly on small branches that are short, thick, not very smooth, or somewhat uneven. Eight or ten leaves emerge from these buds.

Other leaf buds & fruiting buds develop in their axillae for the following year. They're arranged so that there is a fruiting bud next to a leaf bud or a fruiting bud between two leaf buds or a leaf bud between two fruiting buds. The fruiting buds are the biggest & bluntest of all. These three kinds of buds are quite difficult to tell apart during the winter; there are types of cherry trees where all the buds are slightly pointed and others where all the buds are rather blunt. As a result, they can be more or less identified only by comparing them to one another.

3°. The leaves of cherry trees are folded in half within the bud. They're situated alternately along the branch. They're oblong in shape, almost an elongated oval, terminating in a point at the ends. The underside is a lighter green than the upper and is accented by a large midrib. Seven or eight smaller veins emerge on both sides of it that in turn branch out into many very small ones. The upper side of the leaf is indented with grooves corresponding to the veins underneath. The size, thickness, denticulation, shade of green, &c. vary with the type of tree. At the end of the petiole, near where the leaf opens up, there almost always are two small swellings shaped like red-tinged glands.

4°. Flowers blossom on cherry trees at the end of March or the beginning of April. They are hermaphroditic, suspended on fairly long stalks. Usually several emerge from the same bud. They're composed of: 1°. a cup-shaped calyx divided from the top into five sections or indentations hollowed spoonlike. When the flower has opened, they fall back down on the cup or on the portion of the calyx that remains undivided. The calyx has a hole at the bottom, & since it's penetrated there by the stalk, it sometimes remains in place, dried up, until the fruit ripens. 2°. five thin, rounded petals, larger or smaller

depending on the kind of tree. They're attached by an extremely thin unguis to the corners that form the indentations in the calyx. They're white & take on a red tinge when they're ready to fall off. 3°. twenty to thirty stamens that terminate in olive-shaped tips & are attached to the inside walls of the calyx by slender filaments of different lengths. 4°. a rounded ovary located at the bottom of the calyx and crowned by a style terminating in a blunt stigma.

5°. The fruit of the cherry tree is succulent and covered by a thin, plain, & smooth skin. At the center is a hard & woody pit containing a kernel made up of two lobes & a germ. The size, shape, color, flavor, &c. of the fruit vary with the type of tree.

We'll divide the cherry trees into two groups. The first will include cherry trees with heart-shaped fruit & the second group will be cherry trees with round fruit.

FIRST GROUP.

CHERRY TREES with heart-shaped fruit.

THE CHERRY TREES in this group are large trees that grow straight up, support their branches well, and let their large deeply dentate leaves & slightly open flowers hang down. The shape of their fruit gives them their name & is their main feature. It's either bitter or sweet & sugary and is covered with a skin that clings to the flesh. The principal kinds that belong to this group are the wild cherry trees, the gean cherry trees, & the bigarreau cherry trees.

WILD CHERRY TREES.

I. *Larger wild CHERRY TREE with smallest heart-shaped fruit, mildly sweet or tasteless.*

WILD CHERRY TREE with small fruit.

This tree grows to be the largest of its kind. It supports its branches well that stretch out without becoming cluttered.

Its shoots are strong & vigorous. The bark is light, smooth, & bright.

The buds are long & pointed and are quite far apart from one another.

The flowers are pendent and slightly open. When spread out they're fourteen or fifteen *lignes* in diameter. The petal is very white, about seven *lignes* long, four-&-a-half *lignes* wide, slightly puckered at the edges, & split or sort of cut into a heart shape at the tip. Two or three flowers emerge from the same bud. The pedicel is slender and fifteen *lignes* long.

The leaves are large, four to five inches long, two or two-&-a-half inches wide, shiny green above, whitish green underneath, folded along the central vein, dentate & bidentate on the margins, and pendent on petioles about two-&-a-half inches long that are slender & too frail to support them.

The fruit is very small, about five *lignes* high with a diameter of four *lignes* and almost the same width at both ends, making it more oval than heart-shaped. It's divided along its height by a very indistinct groove.

The skin is white, red, or black, depending on the variety of wild cherry tree or on the degree of ripeness of its fruit; the black fruit variety takes on these three colors successively. The red fruit varieties turn a very deep brown or black

when they're extremely ripe. But this color is restricted to the skin and doesn't extend to the flesh, the juice, & the pit.

The flesh is dry and there's very little of it.

The juice is acrid & becomes tasteless when the fruit is extremely ripe.

The pit is oval, large in proportion to the size of the fruit, and it clings firmly to the flesh.

This small fruit, left strictly for the birds, ripens around the end of June. It's so light that it hangs down much less than other fruits in the same group.

Since the wild cherry tree is propagated & grows from pits everywhere in the wild, there are many varieties of it, all about equally objectionable when it comes to their fruit. It's cultivated in nurseries to generate stocks on which all kinds of cherry trees can be grafted. Grafts separate easily from the small black fruit variety.

II. *Larger wild CHERRY TREE, fully flowered.*
Larger wild CHERRY TREE, and also with multiple flowers. H.R.P.

Double-flowered WILD CHERRY TREE.

THIS WILD CHERRY TREE is no different from the preceding one in habit & foliage. But it doesn't get as large. Its shoots are shorter & more full of buds. The flowers are from nine to eighteen *lignes* in diameter. They consist of about forty petals arranged like a rose, about thirty stamens, & a prodigious pistil formed by two small, reflexed leaves that clasp one another. This tree, a marvel and one of the chief wonders of spring, blooms at the end of April or at the beginning of May. Since it produces no fruit at all, I won't describe it any further.

III. *Larger wild CHERRY TREE with heart-shaped fruit, black, mildly sweet.*
Larger CHERRY TREE, also wild, with mildly sweet fruit, tinged with black. C.B.P.

WILD CHERRY TREE with large black fruit.

This variety doesn't attain the size of the wild cherry trees with small fruit. Its shoots aren't as strong & are more of a brown color. The leaves are a deeper green. The veins usually are tinged or spotted with a red color that often is noticeable in the corresponding grooves on the other side. Three or four of its flowers emerge from the same bud. They open more, but they're not quite as large (thirteen *lignes* in diameter). The petal, more rounded and less of a pure white, is six *lignes* long and seven *lignes* wide. Part of the calyx & its segments are bright red. The pedicels are quite big.

The size of its fruit greatly exceeds that of other wild cherry trees & approximates that of the small geans. It's elongated & is suspended from large stalks.

The skin is delicate and black when the fruit is thoroughly ripe.

The flesh is deep red, soft and mushy.

The juice is the same color as the flesh, plentiful, sweet & sugary, but a bit tasteless.

The pit is large & tinged red.

This wild cherry tree is cultivated for its fruit that liquor-makers use to color ratafias & to mitigate the sharpness of brandy & of other fruit.

GEAN CHERRY TREES.

I. *Larger garden CHERRY TREE, heart-shaped blackish fruit with tender& juicy flesh.*

GEAN CHERRY TREE with black fruit. (*Pl. I. Fig. 1.*)

THE GEAN CHERRY TREE, a little less tall than

the wild cherry tree, is much bushier. Its branches are more slender & very leafy which makes them hang down a bit, & they don't support themselves as well as those of the wild cherry tree.

Their shoots are quite strong & the bark is brown.

The buds are long, moderately thick, and well rounded around their diameter.

The flowers open up only a little. The petals are very thin, six *lignes* long, five *lignes* wide, and somewhat spoon-shaped. Their tips are not split into a heart shape as much as those on the wild cherry tree.

The leaves are large, almost oval, narrower near the stalk than at the other end that terminates in quite a long & sharp point. The margins are deeply dentate & bidentate. The upper surface is a deep green and not very deeply grooved. The underside is light green. The midrib is very prominent. There are ten to twelve lateral veins that are quite elevated but very thin. The large leaves on the fruiting branches are three inches seven *lignes* long & nineteen *lignes* wide. The stalks are fifteen to twenty *lignes* long. The large leaves on the shoots are about four-&-a-half inches long and two-&-a-half inches wide. The stalk is twenty-seven *lignes* long. The leaves are pendent & fold inward along the central vein.

The fruit is nicely heart-shaped, flattened, and much larger next to the stalk than at the tip. It's nine *lignes* long, the large diameter is eight-&-a-half *lignes* & the small diameter seven *lignes*. The stalk, thirteen to eighteen *lignes* long, is set into a recess that's quite wide but not deeply indented. The fruit is divided lengthwise by a depression or a very indistinct groove.

The skin is delicate with scattered small irregularities. When the fruit is completely ripe, it's a very deep brown, almost black. The flesh is a very deep red and a little mushy.

The juice is tinged the same color. It's sweet & a bit tasteless.

This gean frequently is picked while the skin is just deep red & the flesh is then firm & red. The juice likewise is red & quite pleasant, even though a bit sour.

The pit is large and clings to the flesh. It's white or very lightly tinted, six *lignes* long, four-&-a-half *lignes* wide, and three *lignes* thick.

This gean ripens at the beginning of June. It would be valued more if the early round cherry didn't appear at the same time.

II. *Larger garden CHERRY TREE with smaller heart-shaped fruit, blackish, with juicy & mildly sweet flesh.*

GEAN CHERRY TREE with small black fruit. (*Pl. I. Fig. 2.*)

This tree is a variety of the preceding one, noticeably different only in that its fruit isn't as big & is less elongated. The fruit is seven *lignes* high; the large diameter is eight *lignes*, & the small diameter seven *lignes*. As a result, when viewed across its large diameter, it's wider than it is high. The groove is indistinct, & it appears as though the fruit were divided in two lengthwise by a small swelling or ridge that extends from the tip to the stalk. The stalk is slender, fifteen to twenty *lignes* long and is set into a recess that is wide and deep relative to the size of the fruit. The skin takes on the same colors as the preceding one, depending on the degree of ripeness. The flesh & juice turn a less deep red, & their flavor is a bit more tasteless when the fruit is extremely ripe. The pit is white or very lightly flesh-colored, five-&-a-half *lignes* long, four *lignes* wide, and three *lignes* thick. This gean ripens at the beginning of June.

III. *Larger garden CHERRY TREE with heart-shaped fruit, partly white, partly red, with tender & juicy flesh*

GEAN CHERRY TREE with large white fruit. (*Pl. I. Fig. 3.*)

This tree differs from the black fruit gean cherry tree only in that the bark on its shoots is an ash gray color and its leaves are a paler green.

The fruit is nine-&-a-half *lignes* long. Its large diameter is eight-&-a-half *lignes* & its small diameter is eight *lignes.* Thus it's slightly flattened on its diameter and is more enlarged at the end near the stalk than at the tip. It's rarely divided lengthwise by a distinct groove but rather by a very fine red line without depth.

The skin is flesh-colored on the side toward the sun & a waxy white on the shaded side. After a lot of exposure to the sun, some of the fruit takes on a light & gentle red tint almost all over.

The flesh is very white, except underneath the reddest parts of the skin where it takes on a slight tint of the same color. It's a little firmer than that of the black gean cherry.

The juice is white & has quite a pleasant flavor.

The pit is completely white and clings tightly to the flesh. It's five-&-a-half *lignes* long, four *lignes* wide, and three *lignes* thick.

This gean ripens about the tenth of June. There's a variety of it that is flatter around its diameter & divided lengthwise by a groove that's very distinct & indeed quite deep on one side of the fruit. It turns much less red.

The three gean cherry trees & their varieties that I've just described are the only ones that are known & cultivated in the vicinity of Paris.

The gean cherries, quite pleasant to eat off the tree, lose their value when transported even a short distance. Their soft flesh is easily bruised, & they're then flat & tasteless.

IV. *Larger garden* CHERRY TREE *with heart-shaped fruit, red, late-ripening, with tender & juicy flesh.*

GEAN CHERRY TREE with late red fruit. Iron or St. Gilles GEAN CHERRY.

I won't enlarge upon this gean cherry tree that is very close in height to the wild cherry tree. The flowers begin to open only around the end of April, & the fruit ripens only in September & October, months that are already plentiful with excellent fruit. By comparison, this one only can seem inferior.

Maine, Normandy, & some other provinces have several kinds of geans of different colors, sizes, & qualities that I won't mention at all & that I believe there's little use in publicizing. This type of cherry tree is worth cultivating only for extra production during the early fruit season. However, I make an exception for the gean cherry tree below that is incontrovertibly the most highly regarded of its kind & whose fruit can match several fine round cherries that ripen at the same time.

V. *Larger garden* CHERRY TREE, *black, glossy, heart-shaped fruit, with tender, juicy & most tasty flesh.*

GEAN CHERRY TREE with large black glossy fruit.

The habit of this tree is the same as that of the other gean cherry trees.

The shoots are medium-sized, not very round, & sort of grooved at the end. The color is yellowish without, or almost without, any spots.

The bud is long, not very pointed, and quite close to the branch. The fruiting bud is moderately blunt and quite swollen in the middle into an oval shape.

The flower is formed the same way as those on other gean cherry trees. It opens only a little & usually is smaller. The petals are

barely five *lignes* long by four *lignes* wide. They're slightly concave & have a heart-shaped cleft at the tip. The calyx & its sections are tinged deep red-brown on the side facing the sun. The rest is green mingled with some reddish color.

The leaf is large, light green on the inside and vivid green on the outside. The margins are deeply dentate & bidentate. The leaf is supported a little less well than that of other gean cherry trees. The eighteen to twenty-five *lignes* long stalk has slight reddish tinge on the side facing the sun. The large leaves on the fruiting branches are nearly five inches long & two-&-a-half inches wide.

The fruit is slightly less big at the tip than it is near the stalk. It's nine *lignes* high, the same across its large diameter, & eight-&-a-half *lignes* at its small diameter. Its stalk is green, slender, eighteen *lignes* to two inches long and set into a small, not very deep recess.

The skin is black, smooth, and glossy.

The flesh is red and firmer than that of other gean cherries.

The juice is plentiful, pleasant & flavorful.

The pit has a slightly red tinge. It's four-&-a-half *lignes* long, four *lignes* wide, and three *lignes* thick.

The fruit is ripe about the end of June. If it ripened earlier, this gean cherry tree would deserve to be cultivated to the exclusion of all of the others.

BIGARREAU CHERRY TREES.

I. *Larger garden CHERRY TREE, larger heart-shaped fruit, rich red, with firm & most tasty flesh.*

BIGARREAU CHERRY TREE with large red fruit. (*Pl. II.)*

Since the bigarreau cherry tree customarily is propagated by grafting, I have no way of knowing its natural size. When grafted onto the wild cherry tree,

it's approximately the same size as the gean cherry tree. It puts out fewer branches but nourishes them better & supports them about as well.

The shoots are stout and not very lengthy. The bark is light brown.

The buds are big & well nourished. The vegetative ones are slightly blunt. The stems are wide & prominent.

The flowers open only a little. The petals are six *lignes* long, five *lignes* wide, and almost round at the tip. The pedicel, barely an inch long when the flower begins to open, sometimes gets to be three inches long by the time it fades. The stamens are very uneven in length. The calyx & pedicel are bright green. Up to six flowers emerge from the same bud.

The leaves are large, about four inches long by twenty-four or twenty-six *lignes*. The large ones are less wide near the stalk than they are at the other end. The small & medium leaves are widest at about their midpoint. They are uniformly and quite finely denticulated & bidenticulated. They're a lighter green & have more veins than those of the gean cherry tree. The slender stalk, eighteen to twenty-four *lignes* long, & most of the midrib, are tinged red. The leaves close up along the central vein or are reflexed inward at the margins & are more pendent than those of the gean cherry tree.

The fruit is large, convex or swollen on one side. On the other it's flattened & divided by quite a deep groove that extends along its entire length from the tip to the stalk. When looked at from that side it appears square because it's practically the same width at the top as it is at the bottom. It's ten-&-a-half *lignes* high, ten-&-a-half *lignes* across its large diameter, & nine *lignes* at its small diameter. The stalk is slender, fifteen *lignes* to three inches long, and set into quite a wide & not very deeply indented recess.

The skin is delicate, smooth, shiny, dark red on the side toward the sun and bright red on the shaded side. Frequently there are some small white spots, especially at the bottom of the groove.

The flesh is very firm & very succulent, whitish, and threaded with whiter veins or fibers. It's red around the pit & beneath the skin on the side struck by the sun.

The juice is plentiful, lightly tinged red, with a very enhanced & excellent flavor.

The pit is oval, yellowish or flesh-colored, six *lignes* long, four *lignes* wide, and three-&-a-half *lignes* thick.

This fruit, the best one of the bigarreaus & of all the fruits in its group, generally ripens after mid-July.

II. *Larger garden CHERRY TREE with larger heart-shaped fruit, white on one side, a pale red on the other, with firm & tasty flesh.*

BIGARREAU CHERRY TREE with large white fruit.

This bigarreau cherry tree differs very little from the preceding one. The bark on its shoots is gray or ash-colored.

Its fruit has the same shape, the same size, & the same proportions. But the skin is a very light red, almost flesh-colored, on the side facing the sun and a waxy white on the shaded side.

The flesh is white, succulent, and a little less firm than that of the red bigarreau.

The juice also is a bit less pleasant & flavorful.

The pit is white.

III. *Larger garden CHERRY TREE with smaller heart-shaped fruit, white on one side, a pale red on the other, with firm sweet flesh.*

BIGARREAU CHERRY TREE with early small fruit.

This is a variety of the preceding one. It differs only with respect to its fruit & the time that it ripens.

The length of this bigarreau cherry is eight-&-a-half *lignes*. Its large diameter is slightly more & its small diameter is seven-&-a-half *lignes*. It's not divided along its length by a grooved furrow, but just by a line that's only discernible by its color & that runs along the middle of a small elevation like a ridge extending from the top to the bottom. The other side of the fruit is divided lengthwise only by a small depression. The stalk is slender, twenty to twenty-four *lignes* long, and is set into a wide & very slightly indented recess.

The skin on the side exposed to the sun is a beautiful soft & light red. The other side is a waxy white mixed with a very light pink tint. Up to this point, this description has differed little from the one we gave for the large white gean cherry. Furthermore, the outsides of these two fruits are so similar that when the fruit trees are interspersed they hardly can be told apart, even though the gean's colors aren't as bright & its white is more amber-colored. The following features identify the bigarreau:

Its flesh is white. Although less firm than that of other bigarreau cherries, it's crisp & much firmer than that of the gean cherry.

The juice, a bit sour at first, sweetens & takes on an enhanced flavor when the fruit is completely ripe.

The pit is white, five *lignes* long, four *lignes* wide, and three *lignes* thick.

It ripens around the middle of June.

IV. *Larger garden* CHERRY TREE *with smaller heart-shaped red fruit and firm, sweet flesh.*

BIGARREAU CHERRY TREE with early small red fruit.

This variety, adopted by many gardeners

& nurserymen, is distinguished from the preceding one only by the color of its fruit, its flesh that's a bit firmer, & the juice that's a bit more flavorful. But I've found many fruits of the preceding variety with all of these qualities after they've remained longer on the tree, with better exposure, struck more by the sun than the others, & are completely ripe. Besides, I've never seen a bigarreau cherry tree with early small fruit that produces all, or mostly all, red fruit. I think that the existence of this variety at least can be considered doubtful.

V. *Larger garden CHERRY TREE with medium-sized heart-shaped fruit and firm, tasty flesh.*

Common BIGARREAU CHERRY TREE.

This bigarreau cherry tree is intermediate between the early & late ones in terms of the size of its fruit, the firmness of its flesh, its flavor & the time that it ripens. Some gardeners claim that there are several varieties of this one as well. But they distinguish them only by color, & a little bit, more or less, by their size & quality - differences that could be due to soil, exposure, and to how ripe they are.

A bigarreau cherry tree, whose habit & all of its parts are no different from the common bigarreau cherry tree, is beginning to be cultivated in some gardens under the name *Belle de Rocmont.*

Its fruit is ten *lignes* high, eleven *lignes* across its large diameter, & about ten *lignes* on its small diameter. It's not as flat & is less elongated than the large red bigarreau cherry. The flattened side has no discernible groove; it's divided only by a very indistinct whitish line. The stalk, eighteen to twenty-four *lignes* long, inserts into a quite deep funnel-shaped cavity with a round perimeter.

Its skin is very smooth & shiny, a pure and beautiful red

in some places, and finely spotted or marbled golden yellow everywhere else. The shaded side is pale red.

The flesh is firm & crisp, slightly yellow on the side where the skin is more highly colored, a little flecked with tiny red spots around the pit, and white elsewhere.

The juice is plentiful, winy, flavorful, & very pleasant.

The pit is a marbled red, five *lignes* long, four *lignes* wide, and three *lignes* thick.

This excellent bigarreau cherry ripens at the beginning of July. It deserves to be more plentiful.

SECOND GROUP.

CHERRY TREES with round fruit.

This group includes 1°. all of the types & varieties of cherry trees whose fruits are properly called *cherries* in Paris. 2°. some types that are included in the first group but actually belong more to the second. The trees in the second group never reach the size of those in the first & don't support their branches as well. Their leaves are smaller, more substantial, a deeper green, and more firmly attached to their stalks. The flowers are smaller but more open. Lastly, the fruit is round, very soft, & acidic. The skin separates easily from the flesh, in contrast to the gean & bigarreau cherries where it adheres strongly.

I. *Dwarf CHERRY TREE with smallest round fruit, acidic, more premature.*

Dwarf CHERRY TREE with premature round fruit. (*Pl. III.*)

The value of this small cherry tree lies in the pre-maturity of its fruit. To make it ripen even sooner, it's customarily planted

on an espalier with a southern exposure, where it rarely grows higher than four feet. In open ground it grows five or six feet high. It's grafted onto suckers of cherry trees with round fruit or onto *Sainte-Lucie* cherry trees.

The shoots are longish, very slender, light brown on the side facing the sun, gray on the opposite side.

The buds are small, elongated, and very pointed.

The flower is eight *lignes* in diameter. The petal is long & narrow, very thin, hollowed spoonlike, and puckered at the edges. Two or three flowers emerge from the same bud.

The leaves are small, a deep green on the inside, lighter on the outside. The largest ones are three inches three *lignes* long by twenty *lignes* wide. From their widest point, nearer to the tip than the stalk, they narrow quite uniformly toward the stalk where they terminate in a point. They also diminish in size toward the other end that terminates in a quite a long point. They're dentate & bidentate. The underside is accented with veins that are not very prominent, & the inside surface is indented with furrows that are not very deep. The stalk is five to six *lignes* long.

The fruit is small, round, and flattened at the ends. It's six-&-a-half *lignes* high & its diameter is eight *lignes*. It's often picked before it reaches this size. But if left to completely ripen on the tree, it sometimes gets to be too big. The stalk is twelve to thirteen *lignes* long and set into a wide & quite deep recess. The small white mark or white spot left behind by the pistil at the tip of the fruit also is in a very small recess. It gives rise to a small groove discernible only up to about half the length of the fruit.

The skin is firm. It’s a light red that becomes quite dark when the fruit is completely ripe.

The flesh is white & a little dry. When the fruit is very ripe, it takes on a light tint of red.

The juice is sharp or extremely sour. Nevertheless, the fruit is valued because it ripens from the end of May or the beginning of June onward, before all other kinds of fruit, whether they have pits or seeds. It graces desserts and is eaten in compotes or glazed with sugar.

The pit is big, three *lignes* long, almost equally wide, & two-&-a-half *lignes* thick. I've often found with these early cherries that when the pit is very small, the fruit is fleshier as a result. I don't know if this is a variety or if the difference is due to the soil or the degree of ripeness.

The *May-Duke*, a variety of the *Chery-Duke* n°. 20 with excellent, fleshier, & also premature fruit, is preferable to this cherry tree.

II. *CHERRY TREE with earlier, sweet, round, medium-sized acidic red fruit.*

Early CHERRY TREE. (*Pl. IV.*)

This cherry tree grows much larger than the preceding one but smaller than most of the cherry trees of its kind. It's customarily grown as a half standard tree. By grafting it onto the wild cherry tree, it can be made into a standard tree, but it only forms a small, not very extensive top. Its branches droop, especially when they're loaded with the abundant fruit that it produces.

Its slender shoots, supple & very numerous, make the top bushy.

The buds are oval, not very pointed, & make quite a wide angle with the shoot.

Three or four flowers emerge from the same bud. They're eleven *lignes* in diameter and are wide open. The petal is rounded and striated at the edges. The sections of the calyx are finely denticulated.

The leaves are two inches nine *lignes* long & twenty *lignes* wide. The ones on the shoots are larger. They become much narrower near the stalk than at the other end that terminates in a short point. The inside is deep green & glossy; the outside is yellowish green. The margins are not very deeply dentate & bidentate; the dentation is blunt. The leaves are held erect on stalks twelve to fifteen *lignes* long.

The fruit is medium-sized, a bit flattened at the tip & much more so next to the stalk that is eleven to seventeen *lignes* long & inserted into a quite indented recess. It's also slightly flattened along its length that is eight *lignes*. Its large diameter is nine-&-a-half *lignes,* & its small diameter is a little under nine *lignes.*

Early on, its skin takes on a light & lively red color. If the cherry is picked at that time, it's an early fruit, but the juice is so sour that it's edible only in compotes. If it's left to ripen completely, the skin turns quite a deep red.

The flesh, almost white, is tinged with red underneath the skin.

Its juice is sweet & pleasant. But by that time it has lost the benefit of its pre-maturity, and its ripening coincides with that of several other good cherries.

The pit is white, almost round when viewed on its flat side. It's at most four-&-a-half *lignes* long, the same width, & three *lignes* thick.

This cherry starts to appear ten or twelve days after the small premature one.

✲

III. *Common CHERRY TREE with round fruit.*

Common CHERRY TREE with round fruit.

This term includes many varieties of cherry trees grown from pits in vineyards, orchards, enclosures, & even in the woods. They all grow larger than the preceding one, and some of them on rare occasions grow larger than most of the ones that follow. They vary with respect to the size of the tree, their leaves, & their flowers. They vary even more in the size, flavor, and time of ripening of their fruit. There are small, medium, and a few large ones. Some are acrid, bitter, harsh, tart, sour, slightly sour, & pleasant. Some follow the early cherries, or even mature along with them. Others only ripen in September.

These cherry trees require neither care nor cultivation. When they begin to bear fruit, the quality is checked. Those producing good fruit are saved. They're propagated by suckers that emerge from their base & from their roots. The ones with inedible fruit are uprooted, or better kinds are grafted onto them. A further advantage is that they set their fruit well & fail to produce it much less often than the others do. For this reason, in places where people pay particular attention to cultivating cherry trees, they prefer the common cherry trees to more beautiful varieties. They have fewer problems & are more apt to produce a plentiful yield in the season for this fruit.

There's a beautiful variety that has begun to be propagated in the vicinity of Paris. It's about ten *lignes* in diameter by almost the same height. It's rounder & a little less enlarged at the tip than near the stalk. It's a bit flatter on one side, & there's a noticeable line that extends from the tip to the stalk through the middle of the flattened part. The stalk is eleven to thirteen *lignes* long,

quite well sustained, and set into a deep but narrow recess. The skin is a beautiful light red. The flesh is white; the juice is plentiful but a bit tart even when the fruit is completely ripe. The pit is five *lignes* long and has the same diameter. It's flat & terminates in a small, very keen & sharp point. It ripens toward the end of June, after the early fruit. It's the most beautiful of the cherries in the spring season. I believe that it's a variety of n°. 12, but it's much inferior to it in quality.

I won't undertake a description of the other varieties. Sometimes more than twenty of them can be recognized within a single vineyard or in an average sized cherry orchard. And in a neighboring vineyard or orchard few would be found that are exactly the same. So detailing them all would take longer than is practical & would require frequent additions. But I ought not omit some with very distinctive features.

IV. *Common double-flowered CHERRY TREE.* Lob. Icon.
Multiflowered fruiting CHERRY TREE. Ger. Emac.

Semi-double-flowered CHERRY TREE. (*Pl. V.*)

The flower of this variety clearly distinguishes it from all of the others. It's composed of fifteen to twenty petals, one or two pistils at its center, & the same number of ovaries for fruit. When the flowers with double pistils set their fruit, something that generally happens only on old trees, the fruit is twinned. The pistils of some flowers develop into small green leaves & these flowers are sterile. In the end, it's only the flowers with a single pistil, & only a few of those, that produce fruit. The fruit is medium-sized, a vivid light red, not very fleshy, and extremely acidic. So this cherry tree is worth cultivating only for its flowers.

V. *Common CHERRY TREE full of sterile flowers.*

Double-flowered CHERRY TREE.

This cherry tree bears flowers with more petals than the previous one, from twenty-five to thirty. An enormous pistil emerging from the middle of the calyx or degenerating into small green leaves makes the flowers much less beautiful than those of the wild cherry tree. It can be raised as a bush tree that is not practical for the wild cherry tree. Since it doesn't produce any fruit, it belongs in an ornamental garden.

VI. *Common CHERRY TREE with round fruit, fragile pit.*
or? Garden CHERRY TREE with fruit without ossicles. H. L. B.

CHERRY with soft pit. Soft pit CHERRY.

ALTHOUGH several books on agriculture mention stoneless cherries, & even confidently offer methods for obtaining them, I doubt that they exist & that methods for producing them are successful. The present cherry tree is a variety of the common cherry tree that has fruit about eight *lignes* in diameter & the same height. The fruit stalk is very slender, thirteen or fourteen *lignes* long. The pit is woody but extremely thin & is easily broken. This cherry is quite good for a common cherry.

As to cherry trees with fruit called *leaf cherries,* I think that the small leaf that ordinarily remains attached to the stalk of the fruit when it's picked is not sufficiently characteristic to constitute a variety. Rather, it happens by chance more frequently among these cherries & less often among other kinds where it also can occur. The cherries that go by this name are inferior and at most are suitable only for making wine or ratafias. Nevertheless, there's an extremely good leaf cherry

that consistently retains this feature. I've never found one with a stalk that did not have at its origin one or several small well-formed & denticulated leaves, often accompanied by stipules.

This fruit is big & beautiful. It's ten *lignes* high, its large diameter is eleven *lignes* & the small diameter is nine-&-a-half *lignes*. Thus it's flatter on one side and divided from one end to the other by a slightly indented line. It's very much reduced in size near the tip. This together with the flattening gives it a shape like a large gean cherry that's been shortened. The well-nourished stalk, fifteen to twenty *lignes* long, is tinged with red at the end that inserts into the fruit in the center of a quite deep but narrow cavity.

The skin is a very deep red-brown.

The flesh is red. The juice is sour. When extremely ripe it loses quite a bit of its tartness; it won't disappoint those who like their cherries to have a bit of a lively flavor. But at the least it's very good in compotes.

The pit is large & very lightly colored.

It ripens shortly after mid-July. If its habit & its leaves didn't so closely resemble the Portugal morello cherry tree, I'd guess that this cherry tree is a variety of the cherry-gean or of the morello cherry.

VII. *CHERRY TREE fruitful with sweet, medium-sized round fruit, a rich red.*

Very fertile CHERRY TREE. CHERRY TREE with clusters.

This cherry tree is intermediate in size between the premature cherry tree & the early cherry tree. Since it persists almost as a dwarf, it's better to graft it onto the *Sainte-Lucie* cherry tree or onto the common cherry tree, than onto the wild cherry tree.

Its shoots are long, moderately thick, and very numerous

which makes the tree extremely bushy. Through a thin, light gray epidermis covering the bark, the side toward the sun appears to be quite dark brown & the opposite side is yellowish.

The buds are medium-sized, & their stems aren't very high.

The flowers resemble those of the early cherry tree.

The leaves are intermediate in size between those of the premature cherry tree & those of the early cherry tree.

The fruit is of average size and just as plentiful as the branches. These are pretty long & slender; they bend & sometimes succumb under the weight. This makes the habit of this tree not very attractive during its fruiting season, if a cherry tree with branches resembling so many garlands of cherries could possibly be a displeasing sight.

The skin is dark red when the fruit is completely ripe.

The flesh is delicate. Its juice is not unpleasant, but a little more sweetness would contribute a lot to its quality & would make it even more worthwhile propagating. This cherry tree is already highly valued for its great productivity.

VIII. *Sweet CHERRY TREE bearing many round, tart fruits on one pedicel.*

Bouquet CHERRY TREE. (*Pl. VI.)*

This cherry tree appears to be a variety of the preceding one to which it's very similar. It's the same size, very fruitful, extremely bushy, and its long & slender branches droop very low.

The shoots are very slender, rather long, brown or reddish on the sunny side and a yellowish green on the shaded side.

The buds are small & blunt. Their stems are wide & flattened.

The leaves are small, at most two-&-a-half inches long by fifteen *lignes* wide. They're widest much closer to the tip than to the stalk where they're considerably & quite uniformly tapered. They're slightly folded inward along the central vein. The margins are finely denticulated & bidenticulated near their point. They're held firmly on stalks eight to ten *lignes* long.

The flowers, like those on the preceding tree, are a bit smaller than the ones on the early cherry tree (ten *lignes* in diameter). Up to six of them emerge from the same bud. They're composed of five petals, sometimes six or seven, thirty to forty-five stamens, and from one to twelve pistils with the same number of ovaries at their base. They're all attached to the bottom of the calyx without adhering to one another.

These ovaries, some of which occasionally fail to develop, become round fruit that are flatter at the ends. They're generally uneven in size (the biggest ones are eight-&-a-half *lignes* in diameter by nearly seven *lignes* high). They form a bouquet or group at the end of the stalk that is twelve to fifteen *lignes* long. The stalk is quite thick, very rounded, & has no grooves so it doesn't seem to have been formed from several stalks joined together. Each cherry is attached to it by a ligament or small flat filament that emerges from the inside edges of the end of the stalk. They're pressed against each other very tightly & flattened on the sides where they make contact, but they're not joined or stuck together. Each cherry has a white pit. In the biggest ones it's four *lignes* long, three-&-a-half *lignes* wide, and two-&-a-half *lignes* thick. On young trees a single stalk bears only one, two, three, or at most five cherries. Bouquets of eight to twelve are found only on old trees.

The skin, a light & vivid red, is somewhat firm.

The flesh is white. The juice is too sour for the fruit to be eaten other than in a compote or frosted with sugar.

This cherry ripens in mid-June or shortly thereafter.

IX. *Sweet CHERRY TREE that continues to bloom and bear fruit during the summer.*

All-Saints, S. Martin, late CHERRY TREE. (*Pl. VII.)*

The habit, size, & numerous pendent branches of this cherry tree more closely resemble the preceding one than any of the others. But it has some very unique features.

It has only vegetative & fruit buds. The vegetative buds give rise to shoots that are weak, slender, of average length and that have alternate leaves two to three inches long and twelve to sixteen *lignes* wide that terminate in a sharp point. They're a quite deep green inside, light green on the outside, dentate & bidentate, sturdy & held securely on stalks twelve to fifteen *lignes* long.

In spring the fruiting buds give rise to small branches instead of flowers. The first three or four leaves on the branch have fruiting buds in their axillae that are destined to produce small branches similar to these in the following spring. After these first three or four leaves appear, the branch continues to lengthen. As each new leaf develops, one & sometimes two flowers emerge from its axilla. Their pedicels lengthen a great deal up until the time that they bloom.

The flower is eleven *lignes* in diameter. It opens up a bit more than that of the wild cherry tree, but much less so than those of other cherry trees with round fruit. The petal is five *lignes* long and a little wider. It's flat, not puckered at all, or only very little, on the edges, and it's not hollowed spoonlike. The stamens are white. Their tips are yellow & very tiny. The five sepals

of the calyx are large (some are more than six *lignes* long by three *lignes* wide). They look like small leaves, with finely & uniformly dentate margins. They're reflexed onto the calyx & turn bright red when the petals fall off.

Since the first flowers only bloom in June, the fruit generally sets extremely well. It's round, flatter near the stalk & a little along one side. Often a very discernible groove extends from the tip to the stalk. The large diameter is eight *lignes*, the small diameter is seven *lignes*, & it's six-&-a-half *lignes* high. The stalk is quite big, fifteen to thirty *lignes* long, and inserts into a not very hollow recess.

The skin is firm and more of a light than a deep red.

The flesh is white, although it has a small reddish eye. It's intensely red along the ridges of the pit.

The juice is extremely sour.

The pit is white, four *lignes* long, almost the same width, & at most three *lignes* thick.

The fruiting branch doesn't stop producing new fruit until the summer ends. As a result, flower buds, flowers in bloom, fruit that's already set, some still green, others starting to redden & others that are already ripe all appear at the same time. And when this cherry tree is planted on an espalier with a northern exposure, the last of its fruit only ripens in November. In that season it's a pleasure to enjoy a cherry compote, even if the cherries from a northern exposure are a little too tart, even for a compote.

Because of the large number of these fruiting branches that make this tree bushier than any other cherry tree, some of them get covered too much by the others, make very little progress, & yield no fruit at all. There are others that produce only three or four fruits

& stop after the end of July. The entire part of the branch that had borne fruit dries up & dies during the winter.

The leaves on the fruiting branches are very small & not very elongated. The largest ones are eighteen *lignes* long by thirteen *lignes* wide. They're deeply denticulated & bidenticulated. The stalk is five to seven *lignes* long.

Good soil that's been well cultivated substantially increases the size of the leaves & the dimensions of the fruit, so sometimes I doubt that there are several different varieties of this cherry tree. It's more of a curiosity than it is useful.

X. *Sweet CHERRY TREE with larger round fruit, bright & clear red with a short pedicel.*

Montmorency CHERRY TREE with big fruit. Large *Gobet. Gobet* with short stalk. (*Pl. VIII.)*

THIS TREE grows to medium size, about the same size as the largest common cherry trees. It sets fruit with difficulty & generally yields little of it. As a result it's sometimes called *le Coulart* [*Translator's note*: the modern French word *coulard* refers to a vine that aborts or fails to set fruit].

The shoots are somewhat long, very slender, reddish-brown, a little lighter on the shaded side than on the side toward the sun. They're quite lightly speckled with very tiny spots.

The buds are small, quite rounded, blunt, and covered with dark brown scales. Their stems are flat.

The flowers are eleven *lignes* in diameter. The petal is round; the edges aren't very puckered. Three or four flowers emerge from the same bud, & since the fruiting buds are extremely close to one another, this cherry tree looks as though it's putting out its flowers & its fruit in bouquets.

The leaves are small, elongated, narrower near the stalk than at the other end. The largest ones, on shoots of a trained tree, are four inches long and two inches wide. Those on fruiting branches are much smaller.

Their stalk is thick, stiff, and six to twelve *lignes* long. The margins are not very deeply denticulated & bidenticulated; the denticulation is blunt. The veins are very prominent & the corresponding furrows are very indented.

The fruit is big, very flattened at the tip & at the stalk. Its large diameter is eleven *lignes*, the small diameter is ten-&-a-half *lignes*, & its height is nine *lignes*. Often it's not very rounded around its diameter, or it's marred by creases & indentations. The stalk is four to ten *lignes* long, very stout, strong, & set into a wide-open recess. The eye is in a small indentation that's more conspicuous than on any other cherry.

The skin is a beautiful red, vivid & bright, but not very dark.

The flesh, slightly yellowish-white, is delicate.

The juice is plentiful, very pleasant, and not very tart.

The pit is white, four *lignes* long, four *lignes* wide, and three *lignes* thick.

This beautiful cherry, big, very fleshy, as excellent in preserves as it is when fresh, ripens around mid-July. But because it's so unfruitful, the cultivation of this cherry tree has been disregarded and it's now found only among curiosity-seekers & in gardens that are not used exclusively for production. In England it's very common in the county of Kent where it's called the *Kent Cherry*.

XI. *Sweet CHERRY TREE with large round red fruit, pleasantly tart.*

Montmorency CHERRY TREE. [*Translator's note*: Montmorency, a town just north of Paris, is famous for its cherries, lace, and a neighboring forest. In the 18th & 19th centuries it was a popular retreat for artists, writers, and politicians. Jean-Jacques Rousseau resided there for several years]

This cherry tree closely resembles the early cherry tree n°. 2 in size, fruitfulness, arrangement of its branches, leaves, &c. Its flower is a little larger than that of the early cherry tree & the large *Gobet.* Its fruit is smaller than the large *Gobet* & less compressed between the tip and the stalk. Its large diameter

is ten-&-a-half *lignes*, its small diameter is nine-&-a-half *lignes*, & its height is nine-&-three-quarters *lignes*. The stalk is quite thick and fifteen or sixteen *lignes* long. When completely ripe the skin turns a deep red. The flesh is white & delicate. The juice has just sufficient acidity to make it enjoyable & to enhance its flavor. The pit is five *lignes* long, four-&-a-half *lignes* wide, and three *lignes* thick.

This cherry ripens at the beginning of July, before the large *Gobet.* Although it's a little inferior to it in size & quality, this cherry tree is propagated & cultivated in preference to the large *Gobet* tree because it's much less prone to abort & it produces much more fruit.

The Montmorency cherries are the most highly regarded ones in Paris. In fact they rank well above all the ones we've described so far.

XII. *Sweet CHERRY TREE with larger round fruit, paler red, with a most pleasant faintly tart taste.*

CHERRY TREE with big, pale red fruit. (*Pl. IX.)*

This cherry tree grows larger than any of the cherry trees with round fruit that we've discussed up to this point, although it's not very much taller than the largest of the common cherry trees. It grows quite high, supports its branches better than most of the cherry trees in its class, & puts out vertical shoots.

The shoots are quite long, almost double the size of those of the large *Gobet*. They're a darker brown & tend less to red and are speckled with very small gray spots.

The buds are at once both bigger & longer than those of the *Gobet*. They're pointed, even the fruiting ones. The stems are thick & prominent.

The flowers open up a little less than those of the Montmorency cherry trees.

When spread out, they're eleven *lignes* in diameter. The petals are close to five *lignes* long by the same width. They're very concave, puckered, & reflexed inward at the edges. Although in most of them the pistil is longer than the stamens, this cherry tree sets its fruit extremely well. Three flowers emerge from each bud, rarely two, almost never one or four.

The leaves are three inches long and eighteen *lignes* wide. They terminate in quite a sharp point. They're widest near that end; they taper almost uniformly in the direction of the stalk that is stiff & supports the leaf well. The denticulation & bidenticulation are blunt & not very deep. The inside of the leaves is not a very dark green; the outside is a very light green. The stalk, ten to thirteen *lignes* long, & the midrib are tinged quite a deep red.

The fruit is large, well rounded at the tip, flatter at the other end, and very slightly flattened on its diameter. It's ten *lignes* high, eleven-&-a-half *lignes* across its large diameter, and eleven *lignes* at its small diameter. The medium sized fruits have the same proportion, but they're one *ligne* less in each dimension. The stalk is well nourished without being thick, ten to sixteen *lignes* long, and set into a narrow & quite deep recess. The end that's attached to the fruit is a beautiful red, & it's often lightly tinged with the same color for its entire length on the side toward the sun.

The skin is thin, a lively but light or very pale and beautiful red that doesn't deepen even when the fruit is extremely ripe.

The flesh is somewhat transparent, very succulent and white except under the skin that has a small reddish eye.

The juice is colorless, plentiful, very pleasant, and enhanced by a scarcely noticeable tartness.

The pit is white, five-&-a-half *lignes* long,

at most five *lignes* wide and three-&-a-half *lignes* thick. The kernel is full & not very bitter.

This beautiful cherry that ripens at the end of June is one of the very best to eat fresh. It's preferred over all others for making preserves. Not only is it large, very fleshy & very sweet, but also it's light in color which makes the preserves appealing to the eye. It's still hard to find around Paris, but it deserves to be very widespread there.

XIII. *Sweet CHERRY TREE yielding few large, most sweet, beautiful red round fruit. or? Spanish CHERRY.* Lob. & Ger. Emac.

Holland CHERRY TREE. *Coulard* [see Translator's note, p. 0248]. *(Pl. X.)*

THIS TREE is one of the largest in its group, although it's not nearly as tall as cherry trees with heart-shaped fruit. It supports its branches well; there aren't enough of them for it to get bushy or cluttered.

The shoots are quite large & vigorous, of average length, red-brown on the sun side, yellowish green on the shaded side, covered as though marbled with light gray.

The buds are thick & long. Their stems are not very high.

The leaves are large, nearly four inches long by two inches wide, oval shaped, sharp at the ends, dentate & bidentate. They're puckered a lot around the center of the midrib. The stalks are thick, ten to fifteen *lignes* long and a deep red on the side toward the sun.

The flowers are large; they open less than those of other round fruit cherry trees. They're fifteen *lignes* in diameter. The petals are seven *lignes* long and six *lignes* wide. In most cases the pistil extends beyond the stamens by about half of its length.

This can greatly hinder the productivity of this cherry tree that blooms abundantly but yields very little fruit. The flowers form sorts of bouquets like those of the large *Gobet*. Three or four emerge from the same bud, & the buds are clustered in groups of four or five.

The fruit is big and almost exactly round. It's ten *lignes* high; its large diameter is ten-&-a-half *lignes* & its small diameter is ten *lignes.* Frequently one side is divided lengthwise by a well defined crease (some large *Gobets* also have such a crease.) It hangs on a stalk fifteen to twenty *lignes* long.

The skin is a very beautiful red, a true cherry color.

The flesh is delicate, slightly reddish white.

The juice is sweet, very pleasant, and slightly colored.

The pit also has a light touch of red. It's five *lignes* long, four *lignes* wide, and three *lignes* thick.

It ripens about mid-June at the earliest.

If this cherry tree were to produce fruit as plentiful as it is exceptional, it would be preferred over almost all of the others. But as its flowers are very prone to abort, it's cultivated so little that it's becoming a rarity.

There's a cherry tree cultivated under the same name that seems to me to be no different from the common cherry tree, except that its fruit is larger & extremely good. This tree is full of fruit, rarely fails to produce, & is worth propagating.

XIV. *Sweet CHERRY TREE with large round fruit, partly reddish, partly amber in color.*

CHERRY TREE with amber fruit, with white fruit. (*Pl. XI.)*

Of all the cherry trees with round fruit, this one is the largest. Its many long branches are well supported without becoming cluttered.

Its shoots are big & strong, of medium length, and light gray at the base. The tips are green on the shaded side and slightly russet on the side toward the sun. They're dappled with very big whitish spots.

The buds are big (double the size of those of cherry tree n°.13.), elongated, pointed, and the same goes for the fruiting buds. The stems are wide & enlarged.

The leaves are extremely large. The ones on the shoots are four-&-a-half inches long by two inches wide. Those on the fruiting branches aren't quite as long & are wider. They terminate in a long, very sharp point. The inside of the leaf is light green, and the outside is a bright green. The denticulations are very large & deep and replete with double or triple bidenticulations. The veins are very prominent. The large stalks, eight to thirteen *lignes* long, allow the leaves to hang down a little. As a result, this cherry tree by its size, the arrangement of its branches, the length & disposition of its leaves, very much resembles a cherry tree with heart-shaped fruit.

The flowers are thirteen *lignes* in diameter. The petals are six *lignes* long, five *lignes* wide, and very concave or hollowed spoonlike. The flowers open up less than those of most cherry trees with round fruit. Normally four of them emerge from each bud.

The fruit is big, quite rounded at the tip and more or less flattened at the other end. Some are eleven *lignes* at their large diameter, ten *lignes* at their short diameter, & nine *lignes* high. Others are ten-&-a-half *lignes* at their large diameter, nine-&-a-half *lignes* at their short diameter, & nine *lignes* high. As a result, the heights are the same although the diameters differ. The stalk is slender, fifteen to twenty-four *lignes* long.

The skin is delicate and slightly firm. It's tinged a light red on fruit that is not covered

and exposed to the sun. On the shaded side it's sort of dappled or marbled with light red & yellow. It's mostly amber yellow, with the remainder a very light red on fruit that's been covered or shaded by leaves. Before the fruit ripens, it's almost completely amber in color.

The flesh is slightly transparent, white, laced with even whiter fibers and very lightly tinted with red under the skin on the side toward the sun. The skin is a bit firm and makes this cherry seem crisp.

The juice is plentiful, sugary, sweet without being bland and is excellent when the fruit has completely ripened on the tree.

The pit is white and terminates in a very tiny sharp point. It's four-&-a-half *lignes* long, a little less wide & three-&-a-quarter *lignes* thick.

This exceptional cherry ripens around mid-July. Like most good cherries, its shortcoming is that it sets fruit with difficulty & it's not very plentiful.

The cherry called *Amber* has a most appropriate name. Its skin is almost entirely amber yellow & takes on only very little red. It's barely medium sized, slightly elongated, & more enlarged near the stalk than at the tip. It doesn't compare in quality to the one just described, & the cherry tree that produces it is cultivated more for the singularity of its fruit than for its utility.

XV. *Sweet CHERRY TREE with large, round, most sweet black fruit.*

MORELLO CHERRY TREE. (*Pl. XII.*)

This cherry tree isn't quite as large as the preceding one. It has fewer branches; they're bigger and it supports them well. It yields less fruit.

The shoots are short, stout, and a red-brown that is not very dark

on the side facing the sun and green on the shaded side.

The buds are big at their base and come to an almost conical point. Their stems are flattened.

The flowers open fully. Usually three emerge from the same bud. They're an inch in diameter. The petal is a bit wider than it is long, very much hollowed spoonlike and slightly puckered in the middle. The calyx is very red.

The leaves are large, very deep green, and terminate in a long & sharp point. They're folded along the central vein, slightly pendent on their stalks, deeply dentate & bidentate, and oval shaped, pointed at both ends. The petioles are about fifteen *lignes* long. The leaves are three to three-&-a-half inches long by twenty to twenty-two *lignes* wide.

The fruit is big, compressed a little near the stalk and sometimes even a little at the tip. It's flattened lengthwise along one side. A very lightly traced furrow or a very thin line often is evident at the center of this flattened part. Its large diameter is ten to eleven *lignes*, the small diameter is nine-&-a-half to ten *lignes*, and its height is eight-&-a-half to nine *lignes*. The stalk, thirteen to nineteen *lignes* long, well nourished, is inserted into a quite wide but not very deep cavity.

The skin is delicate, black, and glossy.

Its flesh is firm and a very deep red-brown. When the fruit is extremely ripe it sometimes seems to be even darker than the skin.

The juice is a beautiful red, very sweet & very pleasant.

The pit, very lightly tinged with red, is four-&-a-half *lignes* long, four *lignes* wide, and three-&-a-quarter *lignes* thick.

This cherry ripens at the beginning of July. It's one of the most highly regarded, for good reason.

The morello cherry that is the most common one around Paris is medium-sized, oblong, & very flattened. It's a good cherry, but quite inferior to the true morello cherry. Some claim that it's not a variety, but rather it's the same cherry tree whose fruit declines this way when it grows in areas that don't suit it. However, the fact that it sometimes doesn't ripen until around the tenth of August leads me to believe that it's a variety.

XVI. *Common CHERRY TREE with small round fruit, very dark red, mildly sharp & mildly bitter, late-ripening.*

CHERRY TREE with small black fruit. Large ratafia cherry.

ALTHOUGH this cherry tree apparently came from a morello cherry pit, I'm not sure that it should be considered as one of its varieties. It has none of its properties other than the orientation of the branches that grow quite straight & uncluttered. It's quite fruitful. Grafts of it take & adhere to a stock with difficulty. Its shoots are long & of very average thickness. The flowers are eleven *lignes* in diameter. The sections of the calyx are long & denticulated as they are in most of the common cherry trees. The leaves are much less large than those of the morello cherry tree & are held securely on their stalks.

The fruit is small. Its diameter is seven to eight *lignes* & its height is six to seven *lignes*. It's attached to a pedicel about eighteen *lignes* long. Its skin is thick and dark red, very close to black. The flesh also is a very dark red and not very tender. The juice is very red & retains a little bitterness & acidity, even when the fruit is extremely ripe. The pit has quite a strong tinge of red.

This cherry that ripens in August doesn't make very good eating. But its color, its slight bitterness & even its tartness make it very good for ratafias & for cherry wine.

XVII. *Common CHERRY TREE with smallest round fruit, very dark red, tart & bitter, late-ripening.*

CHERRY TREE with very small black fruit. Small cherry for ratafias.

This is a variety whose height, shoots, leaves, fruit, &c. are smaller than those of the preceding one. The stalk supporting the fruit is extremely long & almost always has a small leaf at its origin. The pedicel of the bud that becomes the common attachment for three or four fruit stalks sometimes reaches a length of four to six *lignes*.

This cherry ripens a little later than the preceding one. Its juice is more acrid & more bitter, which makes it preferable for ratafias.

XVIII. *Sweet CHERRY TREE with the largest round fruit, verging from red to blackish, most tasty.*

Portugal MORELLO CHERRY TREE. (*Pl. XIII.)*

This is a vigorous tree of average size and is quite fruitful.

The shoots are stout, strong, & very short. They're yellow mingled with a reddish color.

The buds are big, short, blunt, often double & even triple.

The flowers are ten *lignes* in diameter. They're fully open; three or four emerge from each bud. The petals are much wider than they are long. They're divided lengthwise by a large crease & are a bit ruffled at the edges.

The leaves are large. The ones on fruiting branches are three-&-a-half inches long by twenty-six *lignes* wide. They're widest very near the tip that terminates in a small point. They narrow a lot near the stalk without ending in a point. Their denticulation is large, deep,

blunt, & bidenticulated near the tip of the leaf. The stalks are strong, eighteen to twenty *lignes* long. The leaves on the shoots are substantial, four-&-a-half to five inches long and twenty-four to twenty-eight *lignes* wide. They're wider near the stalk than they are at the other end that terminates almost uniformly in a very elongated point. The stalks are thick & strong, fifteen to twenty *lignes* long, and tinged violet red.

Its fruit is very big & very beautiful, flattened at the ends & a little on one side. Generally its large diameter is eleven *lignes*, its small diameter is ten lignes, & its height is eight-&-a-half to nine *lignes*. Some of them are an inch across their large diameter, eleven *lignes* on the small diameter, & nine-&-a-half *lignes* high. The stalk, nine to fifteen *lignes* long, is thick, especially where it inserts into the fruit and is secured in a wide & quite deep cavity.

The skin is crisp, a beautiful red-brown bordering on black. It's not as dark as the morello cherry n°.15.

The flesh is firm. It's a dark red that becomes much lighter near the pit.

The juice is a beautiful red color, plentiful, excellent, not acidic, accented with a pleasant slight bitterness. It's more or less noticeable depending on the terrain that causes a lot of variation in the flavor of this fruit, but it's always very good.

The pit, that very closely resembles that of the morello cherry, is almost white or very lightly tinted. It's four-&-a-half *lignes* high, four *lignes* wide, & three-&-a-half *lignes* thick.

This morello cherry ripens at the beginning of July. It's considered to be the biggest & the best of all the cherries. Some call it *Royal, Archduke, Royal Holland, Portugal Cherry,* &c.

XIX. *Sweet CHERRY TREE with large roundish fruit, tending from red to blackish, sour.*

German MORELLO CHERRY TREE. Lime MORELLO CHERRY. Large cherry of the Count of Sainte Maure [*Translator's note*: a district in the Loire valley]. (*Pl. XIV.)*

All the parts of this cherry tree are as small & delicate as those of the preceding one are big & vigorous.

The shoots are long, slender, brown or reddish on the side toward the sun, yellowish green on the opposite side. The oldest wood is dark brown.

The buds are oblong, blunt, and well nourished. The stems are wide.

The flowers don't open up as much as those on other cherry trees, but more so than the ones on wild cherry trees. They're fifteen *lignes* in diameter. The petals are wider than they are long, very concave & often cleft into a heart shape. Three or four flowers emerge from each bud.

The leaves on the fruiting branches are small, short, and narrower near the stalk than at the other end that terminates in a very small point. The denticulation is fine, regular, blunt and not very deep. These leaves are two inches to two inches six *lignes* long by sixteen to nineteen *lignes* wide. The stalks are slender, six to eleven *lignes* long. The leaves on the shoots are three inches long, twenty *lignes* wide and terminate in a long point. They're blunt or slightly rounded when they open and quite deeply denticulated & bidenticulated near the tip.

The fruit is big, eleven *lignes* at its large diameter, ten *lignes* across its small diameter and ten-&-a-half *lignes* high. Most often the height and the large diameter are the same. So since it's flattened lengthwise, compressed & larger at the stalk than at the tip, the shape is rather more elongated than round. The stalk is slender, fifteen to twenty *lignes* long, and set into a wide but not very indented recess.

The skin is a dark red-brown, verging on black, but less so than the common morello cherry.

The flesh is deep red.

The juice is plentiful, a bit too sour-tasting, and in cold & damp regions it gets to be downright harsh. So even if this beautiful fruit has somewhat of an advantage over our morello cherry in size, it's much inferior to it in flavor.

The pit is close to six *lignes* long, four-&-a-half *lignes* wide, and three-&-a-half *lignes* thick. It's slightly colored and terminates in a small point.

This fruit ripens in mid-July.

XX. *Sweet CHERRY TREE, very fruitful, with large rounded most sweet fruit, from red to somewhat blackish.*

ROYAL. *Chery-Duke.* (*Pl. XV.)*

This tree is barely medium-sized. It sets its fruit extremely well & yields a very abundant crop.

The shoots have a slightly reddish tint on the side facing the sun. The other side is a very light green. On a trained tree they're neither strong nor long because the branch growth is weak.

The buds are small, long, and pointed, & the stems aren't very high.

The flowers open fully; they're fourteen *lignes* in diameter. The petals are oval, hollowed spoonlike, frequently cleft at the tip into a heart shape, and attached by quite long ungues. Two to five flowers emerge from the same bud.

The leaves are a very deep green on the inside, a bit lighter on the outside. They're held securely on thick stalks about an inch long with a red tint that infrequently extends onto the midrib. The margins are quite finely denticulated

though not very deeply nor sharply. They're partly bidenticulated. Near the tip that terminates in a point of average length & sharpness, the leaf is much wider than it is near the stalk where it tapers uniformly & ends in a point. The leaves on the shoots are four to five inches long & two inches to two inches nine *lignes* wide. The ones on fruiting branches are much smaller, & those at the tips of the shoots have the reverse shape.

The fruit is big, a bit compressed at both ends, & flatter along its length than are most of the round cherries. Its large diameter is nine to ten-&-a-half *lignes*, the small diameter is eight to nine *lignes* & its height is seven-&-a-half to nine *lignes.* The stalk is of average size, twelve to twenty *lignes* long, entirely green and set into a wide & quite deep recess.

The skin is a beautiful red-brown verging on black when the fruit is extremely ripe.

The flesh is red and a bit firmer than that of the morello cherry.

The juice is red, not sour, very mild & indeed in some locations not sufficiently flavorful.

The pit is four-&-a-half *lignes* long, three-&-a-half *lignes* wide, and three *lignes* thick.

This cherry ripens about the beginning of July.

Three principal varieties of this cherry tree are cultivated that differ only in their fruit. They are the following: the early Royal or *Duc de May* or *May-Duke.* Its fruit is smaller & it ripens very much earlier, from the end of May or the beginning of June onward. It's much superior in quality to our premature cherry. The late Royal, that has beautiful but too sour fruit; it ripens only in September. & the *Holmans-Duke*, a beautiful & outstanding cherry.

XXI. *Sweet CHERRY TREE, very fruitful, with large, somewhat heart-shaped sweetest fruit, from red to blackish.*

CHERRY- GEAN. (*Pl. XVI. Fig. 1.)*

THIS CHERRY TREE grows just as large as the morello cherry tree n°.15 & bears much more fruit. I believe that it's a variety of the *Chery-Duke*.

Its shoots are big & strong, of average length in proportion to their thickness, but much longer than those of the Portugal morello cherry tree. The bark, an extremely light pale reddish color, is covered with a pearl-gray epidermis.

The buds are large, oval, elongated, quite pointed, and set at a distance from the shoot. The fruiting buds are shorter & moderately blunt. The small fruiting branches have a group of ten to fifteen of them at their tip like the *Chery-Duke*. Each bud yields three or four, & more commonly, five flowers.

The flowers, like the ones on the *May-Duke*, look very much like the small flowers on the gean cherry tree. They don't open up very much. When spread out they're at most twelve *lignes* in diameter. The petals are about five *lignes* long by the same width. The calyx & its sections are green on the shaded side and light red on the opposite side.

The leaves have the same shape & proportions as those of the *Chery-Duke*. They're considerably larger & yet a little narrower near the stalk. The ones on the shoots are five to six inches long by three inches wide. Their denticulation is large, blunt, and deep with double or triple bidenticulation.

The fruit is big. The large diameter is ten-&-a-half *lignes*, the small diameter is eight-&-a-half to nine *lignes*, & it's nine *lignes* high. It's flattened on the sides and is not divided by any groove. The surface is a bit uneven along

these flatter sides. A slender stalk, eighteen to twenty-four *lignes* long, is set into a wide & deep cavity. The fruit is much bigger at this end than at the other; it's such that the large diameter is ten *lignes* near the stalk, but only about seven *lignes* thick to within a *ligne*-&-a-half from the tip. As a result, it's shaped very much like a large gean that's been shortened.

The skin is a deep red-brown. When the fruit is completely ripe, it's almost as black as that of the morello cherry.

The flesh is a little softer than that of the *Chery-Duke*. It's a deep red that lightens a bit next to the pit.

The juice is red, sweet, with a pleasant but not very refined flavor.

The pit is oval, very lightly colored, five *lignes* long, three-&-a-half *lignes* wide, and three *lignes* thick.

This cherry ripens at the end of June. I believe it's the same one that several gardeners call *Royal, New Cherry of England,* &c.

There is a variety of this cherry tree (*Pl. XVI. Fig. 2.)* that differs only in that its fruit is less flattened on the sides, it's a bit larger, & a lighter brown. The fruits don't ripen all at once. Often five cherries on the pedicel of the same bud will be at five different stages of ripeness. Consequently, the fruit can be picked from the tree for nearly a month, from mid-June until mid-July.

We won't discuss at all the *Heaumiers, Cœurets, Guindoliers* [*Translator's note*: *Heaumier* is a common name for the julian, or gean cherry tree *(Cerasus juliana)*; *Cœuret* and *Guindolier* are other cherry trees varieties], & many of the cherry, gean, & bigarreau trees that are merely varieties of those that we've already described. There are others that are suited to certain provinces & to particular regions. Most of them are found only in orchards where people want to collect the good, the average, & the bad ones.

C U L T I V A T I O N.

The cherry tree is not at all hard to grow in natural soil. However, it does better in loose earth with some depth than it does in soil that's too hard, damp, or cold, where the flowers are prone to abort, & the fruit has less flavor or more acidity.

The pits of heart-shaped & round cherries propagate true to type, or produce varieties of their own kind. Sometimes these are good, but most often they're poor ones like those that you find in the woods & in vineyards where a lot of cherry trees grow from pits.

Thus the good kinds & their varieties are perpetuated & propagated by grafting them on wild cherry trees, on cherry trees with round fruit, & on *Sainte-Lucie* cherry trees. All of the cherry trees graft well onto the wild cherry tree, & this is the only suitable stock for those that one wishes to raise as tall standard trees in the open. It has the advantage that it doesn't grow any, or very few, suckers. The *Sainte-Lucie* cherry tree has the same advantage. It accepts grafts from all kinds of cherry trees very well & adapts to the worst conditions.

On stocks of cherry trees of the round fruit group, whether grown from pits or from suckers, grafts from their own group succeed better than do grafts from cherry trees of the heart-shaped group. But it's very inconvenient due to the large number of suckers that grow from the bottom of the tree & from the roots. Half-standard & low-stemmed cherry trees to be grown in the open or as bush or espalier trees are grafted onto stocks of the *Sainte-Lucie* cherry tree or on those of cherry trees with round fruit.

All cherry trees are grafted by cleft grafting, by dormant bud grafting, or even better by immediate growth bud grafting. This is performed on the stocks when the cherry trees begin to bloom.

Cherry trees with round fruit also can be propagated

by layering & even by cuttings. The large numbers of suckers that come out of them will become natural trees.

Cherries are a small fruit that is consumed in large quantities. So it's appropriate to grow cherry trees in the open rather than by other methods so that they'll grow bigger and produce more fruit. However some premature & early cherry trees can be planted on espalier to the south, & some late cherry trees on espalier to the north. That way the fruit is made to grow larger & their season is prolonged by hastening the ripening of some & delaying that of others.

Pruning cherry trees on espalier & as bush trees consists of cutting off poorly situated branches, shortening those that are too vigorous, carefully managing fruiting branches that are small, short, & very full of buds, and giving the trees a shape that's appropriate for them.

For cherry trees growing in the open, it's sufficient to cut off the dead branches, those afflicted with gummosis, & those that droop too much. There's no hope of being able to give most of the round fruit cherry trees the same habit as those with the heart-shaped fruit.

But it's worthwhile to warn that cherry trees need only very little pruning. They frequently die under the pruning hook of a gardener with an urge to cut or the ambition to give the tree a beautiful & uniform shape.

U S E S.

1°. The fruit of the gean, bigarreau, & cherry trees are eaten fresh. 2°. White geans & red ones dried in an oven are exceptionally good. 3°. Bigarreaus are preserved in vinegar just like pickles. 4°. A strong & very pleasant liqueur called *cherry wine* is made from cherries n°s. 17 & 18.

5°. Compotes are made from cherries. 6°. They're candied in sugar, with or without the pit. Cherries n°s. 10, 11, and 12 are the best for this purpose. By not letting them get too ripe, so that they have a lighter color & their juice isn't so sweet, the preserves will be more flavorful, & they won't be as deeply colored & will look more appealing. 7°. They can be dried in an oven. 8°. They're preserved as brandy. 9°. An excellent ratafia, colored with black wild cherries, is made from them. 10°. Morello cherries likewise are preserved with sugar, in vinegar, and in brandy. A ratafia made from them has sufficient color, but n°s. 17 & 18 are preferable.

CYDONIA,
QUINCE TREE.

DESCRIPTION.

THE QUINCE TREE is only a small tree with no uniform shape. The narrow-leaved quince tree, *Cydonia angustifolia vulgaris*, Inst. [*Translator's note*: the genus name *Cydonia* is derived from Cydon, the ancient name for Khaniá, a town in Crete] is no larger than a shrub. It's cultivated only in nurseries by layering & by cuttings to produce stocks to be grafted with pear trees for espaliers, counter-espaliers, & small bush-trees. Other kinds of quince trees are raised as much for the same purpose as they are for their fruit.

I. *Broad-leaved Portugal QUINCE TREE.* Inst.

Portugal QUINCE TREE.

This quince tree is the largest of all & the most suitable for accepting grafts of vigorous pear trees that can't survive on the small-leaved quince tree. It also yields the best & most beautiful fruit but not very much of it.

Its shoots are long & strong, greenish brown, and highly variegated with small tan spots bent around at each node.

The buds are wide at their base, flattened almost as though stuck to the branch. The stems are wide, raised, & bright red at the tip.

The flower is thirty *lignes* in diameter. It's composed of: 1°. A calyx consisting of a single unit divided into five large sections

that resemble small leaves finely denticulated on the edges & accented by a straight midrib & several small lateral veins. They're oval and terminate in a point. 2°. Five large petals fourteen *lignes* long, ten *lignes* wide, rounded at the tip, very concave, arranged rose-like with a beautiful light pink tint on the outside edges and a light pale shade of the same color on the inside. 3°. Fifteen to twenty pink stamens, six *lignes* long, that terminate in yellow tips. 4°. A pistil consisting of an ovary that forms part of the calyx & five yellow-green styles that are much shorter than the stamens & surmounted by stigmata. The flowers of all of the quince trees are the same & differ only by size and the shade of their color that's more or less intense. Those of the small-leaved quince tree are twenty-two *lignes* in diameter. Their petals are a very light pale pink & the sections of the calyx are proportionately much larger. The flowers of other quince trees are in between these & those of the Portugal quince tree.

Flowers of quince trees have no pedicel as such. In spring the fruit bud lengthens & forms a branch that grows five or six leaves & a single flower at its tip.

The leaves are large, alternate, smooth on the edges, light green on the inside, and whitish & covered with thick fine down on the outside. The veins are thin & not very prominent; the main one is tinged with red. The large leaves on the shoots are four-&-a-half inches long and three-&-a-half inches wide; they have a shortened, almost oval shape. The ones on the fruiting branches are more elongated, wide at the stalk, and pointed at the tip. The large ones are four-&-a-half inches long by three inches wide. The leaves of

this quince tree, & those of the common quince tree, barely two-and-three-quarters inches by two inches, can be considered to be the two extremes of quince tree leaves.

Its fruit is big, long, angular or uneven around its diameter of two-&-a-half inches by a height of three inches four lignes. The most enlarged part is farther from the stalk than it is from the tip. It gets much smaller near the tip where the eye is set in a deep cavity bordered by elevated corners or projecting knobs. The eye is surrounded by sections of the calyx that remain on most of the fruits until they ripen. It's not very exposed but is pressed in by five swellings situated behind the sections. The other end of the fruit decreases in size much more, but less evenly, looking somewhat like a gourd. It ends in a blunt point with the tip on the end of the branch that serves as the stalk of the fruit. The end of the branch inserts into a small recess formed by a thickening or an extension of the fruit covering the end of the branch up to the last leaves that it produced.

The skin is yellow and covered by down that's easily removed when rubbed by hand.

It's flesh softer & better than that of other quinces, in preserves as well as in compotes.

The smell & taste of quinces are well known.

The quince has five compartments; each one contains eight to fourteen flattened seeds. The compartments are formed by delicate membranes like those in pears. The axis of the fruit is hollow & star-shaped with five rays that extend in between the compartments.

Quinces ripen at the beginning of October & rarely last beyond November.

II. *QUINCE TREE with more awkward oblong fruit.* Inst.

Female QUINCE TREE.

This quince tree is inappropriately named "female". The tree, its flowers, & its leaves are intermediate in size between the common & the Portugal quinces.

The fruit sometimes is only two inches, six to eight *lignes* in diameter by a little more in height. Sometimes the height is five-&-a-half inches, the large diameter three-&-a-half inches & the small diameter three inches two *lignes.* It has very prominent ridges on it that extend lengthwise. It decreases unevenly in size at both ends that terminate in a very blunt point. The eye is set very deeply into a cavity bordered by eight or ten very prominent & almost uniform knobs. The stalk also inserts into a deep cavity with sides raised into five or six knobs. The skin is extremely smooth & the flesh is a bit granular.

III. *QUINCE TREE with shorter & more rounded fruit.* Inst.

Male QUINCE TREE.

This quince tree is no different from the preceding one except that its fruit is shortened, uneven, and almost round. These two quince trees are more generally cultivated for their fruit because they rarely fail to produce it.

The unpleasant odor of the quince tree's fruit relegates it to the most remote & least frequented corner of a garden. The tree doesn't require any cultivation.

Quinces are eaten stewed in a covered pan or in preserves. They're preserved in quarters & in marmalade and made into confections,

quiddany [*Translator's note*: an old term for jelly or marmalade made from quinces, derived from the French word *cotignac*], ratafia, &c. They are astringents suitable for strengthening the stomach & controlling diarrhea.

Large-leaved quince trees accept grafts of pear trees and sustain them much better than do the small-leaved quince trees, on which very vigorous kinds can't survive. They're propagated by seed planting, layering, & by cuttings. They're grafted on stocks of their own kind, on pear trees, & on hawthorns.

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F I C U S,
F I G T R E E.

GENERAL DESCRIPTION.

THE FIG TREE, in regions more temperate than those around Paris, grows to a very substantial size. In our climate, it's more of a large shrub than a tree. As a rule, it forms a tuft or large bush that arises from only a single stem.

The shoots are stout and slightly grooved near the ends. They have slightly raised nodes that go around them like seams. Each node bears a leaf & one or two round buds consisting of three or four scales that cover a small fig one to one-&-a-half *lignes* in size. The buds & the leaves are arranged alternately along the shoot one to four inches apart. The shoot terminates in a large, long, sharp, conical vegetative bud.

The figs emerge from their coverings from the first nodes of the shoot. They enlarge, & if the end of the summer & the beginning of the autumn are warm, some of them get ripe by September & October. Some fall off without ripening; hoar frosts & cold rain reduce or stop the flow of sap, that even when it's at its most plentiful & in the best of seasons, could be scarcely enough to nourish the large number of figs that appear in the autumn.

Although the rest stay attached to the tree all winter & appear to remain unchanged, they perish in the spring and none of them are successful.

The buds from the last nodes on the shoot remain closed all winter. If the winter hasn't been too harsh & the figs haven't been damaged, they come out in the spring, in April or at the beginning of May, & readily reach maturity. These are called *summer figs, flower figs*, or *first figs*. They're bigger than the autumn ones & much less numerous. The last nodes usually have two buds that sometimes bear fruit at the same time. But often one develops & the other aborts, or one yields fruit in season & the other one later on. Occasionally one fruit & one shoot come out. This is because several new shoots normally emerge from the tip of each shoot, although only the terminal vegetative bud is visible. Branches also can grow out in the middle & at the base of the shoot, & in general from any of the nodes, even though no vegetative buds are visible. This happens as long as the branch is young, because they re-grow with difficulty from old ones.

Fig tree leaves are large & almost as wide as they are long. They are simple & divided fairly deeply into five lobes, depending on the type. They are thick & sturdy, rough to the touch, arranged alternately along the branch, & held on long, stout stalks. The underside is light green, accented with very prominent whitish veins. The other side of the leaf is a quite deep green, somewhat indented with furrows corresponding to the veins. The margins are undulate, & some of the lobes are indented.

The fruit of the fig tree does not originate from a flower as does most other fruit, and it does not develop from the ovary of a pistil.

It can be thought of as a common support or receptacle for a large number of both male and female flowers that are necessary less for the success of the fig itself than they are for propagating the tree from seeds. The flowers are not attached to a support like flowers on a spike or catkin, but they're enclosed inside the fruit as in a capsule that's spherical, conical, or pear-shaped, depending on the type. The only opening in the fruit is the ostiole. It's furthermore almost completely closed up by a large number of imbricate scales (about two hundred) around its edge. The male flowers are located under these scales. They consist of a calyx divided into three, four, or five sections or small leaves held on quite a long pedicel, & two or three stamens that terminate at their tips. The female flowers are located near the stalk of the fig below the males ones. The essential difference between them is that instead of stamens they have a pistil consisting of an ovary that becomes a lenticular seed surmounted by one or two long styles. When the fig has grown to one third of its size, or a little more, its male flowers open & fertilize the female ones. It continues to grow, & it acquires the characteristic size, shape, color, &c. of its species.

I mentioned that the flowers appear to be less necessary for successful figs than they are for the propagation of the tree. Figs harvested in the autumn are completely ripe, in excellent condition, & sometimes even better than the summer ones, even though the stamens of their male flowers have aborted & as a consequence the embryos of the female flowers are sterile. Nonetheless, in the Aegean, in Italy, and in Malta, domestic fig trees are cultivated whose fruit falls off before it's ripe, unless they've been caprified [*Translator's note*: in caprification, flowers on branches of wild figs (caprifigs) are placed near those of domestic figs, which allows fig wasps to help pollinate the latter]. But first of all, the need for this unique procedure is due more to the climate or to some other as yet unknown cause than it is to the type of fig tree, since the fruit

of the same fig tree grows well & turns out better in our southern provinces without the help of caprification. Besides, is it clear that caprification ripens the figs while it fertilizes the seeds? Or is it that the insects that penetrate the figs merely accelerate & complete their ripening, more or less in the way that worms promote that of pears, apples, or other fruit? Caprified figs, like wormy fruit, are much inferior in quality. Regardless of the explanation, this procedure is performed only in the countries mentioned above on a type of fig tree that bears fruit only once a year in the summer & on some other kinds that need it only to ripen their autumn figs. The method has been known since Pliny's time, & several writers on botany & agriculture, both ancient and modern, mention it. Details about it are in the section on fig trees in *Treatise on Trees & Shrubs*, [*Translator's note*: also by Duhamel (1755)].

In our southern provinces & in warmer countries about thirty types of fig trees, including their varieties, are cultivated. We'll limit ourselves here to the few that succeed in all climates where fig trees can exist.

SPECIES AND VARIETIES.

I. *Cultivated FIG TREE, with round, white mellifluous fruit.* Inst.

White FIG. (*Pl. I.*)

THIS FIG TREE is the most common one around Paris & the one most suited to that climate.

Its leaves are large, about seven-&-a-half inches long & slightly wider. Almost all are divided into five lobes less deeply defined than those on most other fig trees, & their crenations aren't very deep.

The fruit is two inches in diameter by about the same or a little

less in height. They're widest near the top & they're flattened at that end. The other end elongates into a point & diminishes in size almost uniformly up to the stalk which is thick, quite round, & three to eight *lignes* long. Ridges that are not very pronounced & barely visible on some figs extend from the eye to the stalk & sometimes are branched. The skin is smooth, a very light green tending a bit to yellow, & it often reverts to that color near the eye. The flesh is very soft, filled with lots of sweet & very pleasant juice. I'd say it has a delicious flavor, if those are the right words for it.

Its autumn fruits are more plentiful, rounder, not as big as the summer ones, & in warm years have a more exceptional flavor.

There are two varieties of this fig tree, or perhaps they're two extremely similar species. One has longer fruit; the fruit of the other is not as big & it's rounder. It's called the *Marseille fig; cultivated fig with premature, transitory, whitish fruit*. Inst. It ripens a bit sooner than the white fig n°.1, & its flavor isn't as pleasant. Its other characteristics are the same.

II. *Cultivated FIG TREE, with small, dark-colored fruit, red inside.* Inst.

Angelic FIG.

The leaves of this fig tree usually aren't quite as large as those of the preceding one. They're less deeply indented & longer than they are wide, about eight inches long by six-&-a-half inches wide. Most are divided into only three lobes. The lateral lobes are joined into a single one on each side, or are distinguishable only by a small indentation. The crenations on the margins are a little more

accentuated. The stalks are a lot shorter.

The biggest fruits are twenty to twenty-four *lignes* high & eighteen to twenty *lignes* in diameter. They often have an elliptical cross-section, three or four *lignes* shorter in one direction than in the other. Their shape is about the same as that of the white fig n°.1, but a little more elongated. The skin is yellow and variegated with long whitish green spots. The pulp beneath the skin is reddish or tan. The flesh is white, but the seeds & the flesh covering them are lightly tinged with red.

This fig tree yields little fruit in the initial season, but it produces it plentifully in the autumn, when they ripen quite well & are extremely good.

III. *Cultivated FIG TREE, with small, round, purple fruit, red inside.*

Purple FIG. (*Pl. II. Fig.1.*).

The leaves of this fig tree are much smaller than those of fig tree n°.1 & are very deeply indented into five lobes, some of which often have smaller notches or deep indentations. The lobes have very pronounced crenations on their margins. The leaves are five to six inches long & are almost the same in width. They're held on stalks of average thickness that are only two or three inches long.

The fruits are quite rounded at their diameter, eighteen to twenty *lignes,* and they're almost the same in height. They're about the same shape as the white fig. When they've grown to full size, the small ridges or prominent lines that run lengthwise disappear & vanish almost completely. The skin is a deep purple. The pulp underneath the skin is white or tinged a very light red. The flesh & the

granules or seeds are a quite dark red.

This fig, very plentiful in autumn, does well in our climate in a warm year, and it does exceptionally well in more temperate climates.

Its variety that has long fruit, *cultivated FIG TREE, with long purple fruit, red inside.* Inst. pear-fig, Bordeaux fig (*Pl. II. Fig.2.*) is about twenty-two *lignes* in diameter & thirty-two *lignes* high. The top is quite round, both at its diameter and at its end. The other end elongates into a very sharp point with an end near the stalk that always is green, even when the fruit is ripe. Over all the rest of the fruit the skin is a deep purple or red-brown with scattered small light green specks or long spots. Its small ridges are very conspicuous. The underside of the skin is a very pale red. The inside of the fruit is more tan than it is than red or purple.

This fig is plentiful in both seasons. In warm years it's extremely sweet & quite succulent but almost tasteless.

C U L T I V A T I O N.

I. The seeds of our summer figs that are left on the tree after they ripen, and those of sun-dried figs that come from our southern provinces & from abroad, are fertile. They're sown in pots or trays filled with light, friable soil and placed in a compost bed. A little soil is sieved over them so that they're very lightly covered with it. They germinate very nicely, & the seedlings progress quite rapidly. But these seedlings are less suitable for growing fig trees that yield fruit promptly than they are for obtaining varieties or foreign species that are difficult to generate from the tree itself.

Fig trees customarily are propagated by layering

& by cuttings. Two-year old branches, & not those of the previous year (they're too soft & are likely to get warm & rot), when treated as described in the section on cuttings, take root easily. For layering, branches of one, two, or three years, or even older, are selected. They're laid down in the ground, or even better, set in a basket, box, or pot filled with soil. One or several cuts are made in the buried part. Within a year these branches put down quite sturdy roots, so they can be separated & transplanted the following spring. Cuttings & layering are done about the end of March before the fig tree's sap begins to run.

Good types of fig trees also are propagated by flute grafting on ordinary kinds of stocks.

II. The fig tree succeeds in all kinds of soil as long as it's not cold & damp, which would make the fruit ripen late & be flavorless. Paved paths, the worst kinds of soil, even among rocks, are suitable for it if they're warm, in a southern or eastern exposure, & sheltered from the north & west by high ground or even better by high walls. Even so, fig trees can be planted in all exposures. Those facing west or even north won't yield autumn figs. But the summer fruit that ripens late will fill the gap between the first & second crops of figs from trees that are planted facing south.

In our climate the tree has to be protected from the harsh winter that sometimes kills all its branches & deprives us of its fruit for two years. New branches that emerge from the rootstock only yield fruit in the third year. Even if only the current year's shoots die, it ruins all our hope for the initial season. These misfortunes are prevented by covering the fig trees. 1°. If the trees are planted against a wall, assuming that it is in good condition & able to block

the ill effects of frost, some of the branches are lowered closer to the ground. The others are fastened against the wall, orienting them horizontally as much as possible without breaking them. They're all covered with litter, leaves, ferns, broom, pea pods, heather, reeds, &c. 2°. If fig trees are planted as bush trees away from a wall, and the season & the appearance of the weather start to raise fears of severe frosts, the base of each fig tree is earthed up, all the branches are brought as close to one another as possible, tied in several places with osier bands or with straw, and covered with long straw held in place by the same kinds of ligatures. Finally, a long rope of straw as thick as one's lower leg is made to wrap it up completely from its base to its top. All the turns are made immediately opposite to one another so that the frost and freezing rain can't penetrate it. A fig tree wrapped up this way looks like a cone or a pyramid. About mid-March the bases of the fig trees are uncovered & as the season becomes milder, the trees continue to be uncovered gradually. The tops remain covered until there's no longer any fear of minor frosts & cold rains, in other words until the beginning of May, or a little earlier or later depending on the temperature that year & on the fig trees' progress. The reason is that when the fruit is about three *lignes* in diameter, it needs to be acclimated to the air so that it doesn't etiolate underneath the straw & subsequently perish in the sun. But if some nights threaten to be too cold, they're covered with cloths or straw mats. However, their exposure & the quality of the soil can either accelerate or retard their progress about a month.

Since fig trees customarily are grown as bush trees that have several branches or shoots originating at ground level, it's a good idea each year to cut some of the largest & topmost of the shoots right back to the trunk.

While the other branches are yielding fruit, the trunk will put out new shoots that will be productive when the former ones, having grown too high, will be ready to be cut back in their turn. There are several advantages to this removal: 1°. the propagation of the branches & consequently of their fruit. 2°. the base of the tree continues to be supplied with young branches, the only ones that bear fruit. 3°. trees kept lower are easier to cover during the winter & are better protected by walls that enclose the area where they're planted.

III. After the winter is over, all dead wood is cut off the fig tree. Also, all of the thin branches that have no hope of yielding any fruit or that are too weak to produce any in good condition are cut off or pruned back to one or two buds. Because on this tree the stout shoots are the ones that yield the most & the best fruit. It's advantageous to shorten parts of these same thick shoots, pruning the longest ones back to a foot long at most. This is to prevent the tree from growing too tall in too short a time & to make these stout shoots grow three or four new shoots instead of the single one that each normally produces. Because, and I'll say it again, the quantity of fruit depends on the number of new branches, since the fruit never emerges more than one time from each bud of the fig tree. Suckers also have to be cut off; they're easily recognized by the flatness of their buds & the large distances between them. If they're needed to fill up an empty space, they're pruned back to three or four buds.

That's all the pruning (if you wish to call it that) that fig trees planted in open ground will need. Those that are cultivated in containers (they aren't very productive & are outside our topic) require some further care, both in their pruning as well as in the rest of their cultivation.

Several people recommend, & la Quintinye makes it a rule,

to nip off the big new shoots at the beginning of June, so that during that summer each one will grow several other shoots of the right kind to increase the harvest of first figs in the following year. This is without a doubt a beneficial practice in warm areas & in good exposures where these secondary shoots can be well lignified before the onset of winter.

Although fig trees subsist well in the driest of soils, nevertheless several pailfuls of water emptied at their base during dry spells restores the activity of the sap & increases the size of the fruit. When the figs have reached about two thirds of their size, a small drop of olive oil placed onto their eye with a brush or a straw hastens their ripening & makes them grow larger than those not treated this way.

USES.

FIGS are eaten fresh. Sun-dried figs are a commercial product in our southern provinces, in Spain, in Italy, & in several countries of the Levant. Caprified figs take on an unpleasant taste in the oven, where they need to be left for a while. So all, or almost all, of them remain in the countries where caprification is practiced.

Dried figs also are used medicinally as emollients, to relieve coughs, mollifiers, nutriments, &c. The milky sap that exudes from their leaves & bark when they're cut or broken is very caustic and leaves marks on the skin that are hard to remove. It's used to get rid of warts.

☼

FRAGARIA,
STRAWBERRY PLANT.

[*Translator's note: The Strawberry: History, Breeding and Physiology,* by G.M. Darrow, an excellent account of the history and varieties of strawberry plants, can be found on http://www.nal.usda.gov/pgdic/Strawberry/darpubs.htm. It includes a chapter on the life and work of Antoine Nicolas Duchesne (1747-1827) who wrote *L'Histoire Naturelle des Fraisiers*, a description of the botany and the cultivation of strawberry plants in Europe, published in 1766. Duchesne and his work are mentioned several times in the pages below.]

GENERAL DESCRIPTION.

THE STRAWBERRY plant deserves a place in the *Treatise on Fruit Trees* because strawberries are counted among the red fruits & go well with them on the table for as long as three months.

1°. The strawberry plant is a perennial with leaves that form neither an opposite nor an alternate arrangement, but rather one that's circular or spiral about a stem that gets to be five or six *lignes* thick & normally grows two or three inches high. With skill they can be grown taller. At the origin of the leaf stalk there is a thin transparent membrane that lengthens into a point on both sides forming sorts of stipules that persist after the leaf itself has dried up. These membranes overlap one another & clasp the stem of the plant.

2°. A bud forms under the axilla of each leaf. Some of the buds are dormant but are always ready to open. Others produce stems or offshoots that resemble the stem from which they originated. Finally other buds form creepers (they're called threads, whips, runners, stolons, filaments, strings, shoots, &c.). They're slender, cylindrical, very long, sometimes as much as two or three feet, and have several nodes along them. Each node bears a bud & an ochrea

that covers the bud & the runner. The bud on each alternate node develops into a strawberry plant offshoot that takes root and forms a new plant. The bud on the next node remains dormant; if the base of the strawberry plant is a vigorous one, it lengthens & puts out a branch or runner that likewise generates new plants & new runners in the same sequence.

3°. The leaf stalk is fairly long, cylindrical, and indented with a small groove running the whole length along the side facing the stem. At the end it divides into three small petioles that continue and form the midribs of the three leaflets that make up the leaf of the strawberry plant. The central leaflet has a uniform shape. It's very narrow at the end where it opens up, and it diminishes in width the same way at the tip. The two lateral leaflets have an irregular shape. Their midribs divide them into two unequal sections. The section next to the central leaflet is about the same shape, size, & proportion as the half of that leaflet. The other section is larger & much wider at its origin than it is at its tip. The leaflets have fairly wide, sharp, deep, &c., serrations along their margins that terminate in small points. As a rule these are the same color as the fruit. The outside of the leaflet is whitish and accented by veins that emerge alternately from the midrib and terminate at the tip of each tooth. The inside is a fairly light green and is indented with furrows corresponding to the veins. Very vigorous strawberry plants produce some leaves with four & even five leaflets. Furthermore, on the leaf stalk two thirds of the way above its origin there are one or two small ears, appendages, or leaflets. Sometimes they're closed up & shaped like a small paper horn or a cone with teeth around its base.

All these irregularities & variations found on leaves of the strawberry plant depend more on the strength of the plant or on specific circumstances than they do on the kind of plant. But there's an unchanging variety of strawberry plant with simple & entire leaves that we'll describe below.

4°. When the strawberry plants have gained the required strength, upright shoots, stems, or cylindrical fruiting branches emerge from the centers of the offshoots or from the main stems. These are thicker than runners and are oriented vertically. The first node on this stem has an ochrea consisting of one, & more often of two, opposite membranes, one of which is long & terminates in a sharp point. The other sometimes has the same shape & size; occasionally it's much larger & is indented into three or five sections. Frequently one of the two, like a stipule, is associated with the very short stalk of a simple leaf, or of one that has two or three leaflets, originating from the node. A single flower supported on a long pedicel emerges from the ochrea, & one or several branches that in turn subdivide into several more with the same accessories. The latter also branch out until nothing more emerges from the node than the flowers that terminate the final branches of the upright. After this stem has yielded its final fruits, it dries up & dies, as does the offshoot that produced it. The dormant buds below this offshoot then open up & form one or several more of them, unless the plant perishes from deterioration or an accident, or some other cause disrupts this normal progression. Sometimes on vigorous strawberry plants the upright shoots bend backward to the ground, or the leaves on the plants protect them from the heat of the sun & from drying out. Far from dying, the plants then put out leaves & roots from their first nodes & give rise to new plants as runners do. One can infer from this that the ochreas on the stems

contain not only a flower & branches but also another bud or rudiments capable of perpetuating the plant.

5°. The flowers consist of 1°. a calyx in one piece divided around its margin into ten long sections that come to a point. The five smaller ones on the outside cover the separations between the large ones. The latter consistently maintain their size & shape. The small sections often vary. Some split at the tip into several points. On vigorous strawberry plants, others grow to a considerable size & then degenerate into sectioned membranes resembling the ochreas on the nodes of upright shoots. Some of them change into a small leaf that is simple or lobed, or that has two leaflets six to eight *lignes* long, dentate, well formed, & held on a petiole one or two *lignes* long. 2°. five white petals, slightly hollowed spoonlike, & attached by extremely short ungues to the inside edges of the calyx where the large sections divide. Their shape varies according to their type. Often it's the same as that of the fruit: round when the fruit is spherical, ovoid when the fruit is something like the shape of a truncated egg. So the shape of the fruit sometimes can be predicted by that of the petals, in the same way that their color corresponds to that of the points of the teeth on the leaves. Generally the flowers that emerge from the first nodes on the stem of a vigorous strawberry plant have more sections & petals. Sometimes there are more petals than there are large sections, & in that case these supernumerary petals are located in a second row in front of the others. 3°. about twenty stamens * with different lengths & orientations.

* The number of stamens varies according to the number & the arrangement of the petals & the type of the strawberry plant. In flowers of European strawberry plants, there usually are four stamens for each evenly placed petal. In those of American strawberry plants there are five or six. Thus the flowers of the latter with five petals have twenty-five to thirty stamens, & those with seven petals have from thiry-five to forty-two of them.

Some lean on the petals, others are close to the pistil. They terminate in light yellow tips. 4°. the center of the flower is filled with one or several threads of contiguous pistils. They're gathered on a fleshy hemispheric receptacle, or more often on one that's elongated & terminates in a blunt point. Each pistil consists of an ovary with a small style set on top of it, surmounted by a stigma. The styles fall off or detach easily when the fruit ripens. The size of the flower varies according to the type, the vigor of the strawberry plant, & which node on the stem they emerge from. Those originating from the first nodes are the largest (these are the ones that we'll describe). Those terminating the final branches are the smallest.

6°. The receptacle enlarges & becomes a soft, succulent fruit whose size, color, flavor, & fragrance differ with the type & cultivation, Strawberries that grow from the first nodes of the upright shoots are the biggest, & some types often have a crooked & uneven shape. The flowers of these distorted fruits almost always have more than five petals. So there's reason to believe that these strawberries are rather like the angular Seville oranges that ordinarily have as many excrescences as there were supernumerary petals in their flowers. The seeds or pips are on the surface of the strawberry, sometimes completely protruding, sometimes in rather indented recesses, depending on the type & distension of the fruit.

The flowers of European strawberry plants that have five petals (they're by far the most common) have only twenty stamens. I said evenly placed petals, as they are in all flowers that have five petals. But when supernumerary petals are in a second row in front of the others, each one of the supernumerary petals has one or two fewer stamens. Sometimes these petals are situated behind the regular ones. In that case there is no reduction at all in the number of stamens. There are exceptions to this observation, & it doesn't apply to the terminal flowers at the tip of the upright shoots, where these components have no definite size nor number.

The upright shoots, runners, leaf stalks, &c. of strawberry plants have fairly thick & plentiful hair or down on them.

SPECIES AND VARIETIES.

I. *Common STRAWBERRY PLANT with red fruit.*

Common STRAWBERRY PLANT with red fruit. (Pl. I.)

Wild STRAWBERRY PLANT. Wild STRAWBERRY PLANT. Du Ch.

Most of the strawberry plants that we will cover are found only in gardens. We won't describe the wild strawberry as seen in woodlands where it grows on its own, but rather the way it grows in kitchen gardens & in cultivated areas.

In the wild this strawberry plant doesn't propagate many offshoots & the leaflets on the largest of its leaves are barely two inches long by eighteen *lignes* wide. It gains so much growth & vigor from cultivation & soil that it often forms clusters of fifteen to twenty offshoots with a large number of leaves that have leaflets that are sometimes three inches eight *lignes* long & two inches eight *lignes* wide. Their margins have long & very sharp denticulations. The outside of the leaf is whitish green accented by thin but very prominent veins. The green of the inside is more vivid than dark. It's indented with grooves that are all the deeper because the leaf had been folded along each vein when it was inside the bud, and it seems to have permanently retained an impression of that first position. The stalks of the leaves are quite firm and four to seven inches long.

The runners ordinarily have a red tint. They get very long & branch out a great deal.

Each offshoot often puts out several upright shoots that rise from six to ten inches, produce a lot of branches,

& consequently lots of flowers. The uprights, the runners, & the leaf stalks are covered with short, delicate, & not very thick hair.

The flowers open fully since the sections of the calyx open out enough to make a right angle with the pedicel of the flower. They fall back upon the pedicel only after the fruit has enlarged there and forces them to lose their initial orientation. This is a characteristic feature of the flowers of most strawberry plants on our continent. The flowers emerging from the first nodes of the upright shoot are nine or ten *lignes* in diameter. They often have more than five petals, & the sections of the calyx are prone to the abnormalities mentioned in the general description. The fruits that develop from these flowers are the biggest ones & often are irregular. I've never seen an irregularly shaped one of these strawberries in the wild, & they're rarely found among those in the first crop of strawberry plants transplanted in kitchen gardens. Consequently these deformities can only be attributable to the plentiful nourishment that makes the plant very vigorous & richly productive.

The fruit of this strawberry plant, both in the wild and in kitchen gardens, is shortened with a height less than its diameter, or elongated into an oval shape with a height the same or greater than the diameter. The wild strawberry looks appealing when it's six *lignes* in diameter & the same in height. Following the first harvest in cultivated areas, there are some that are nine *lignes* in diameter & six to ten *lignes* high.

The skin is a vivid & brilliant deep red on the side facing the sun; the other side is a lighter red. Some spots are a slightly greenish white or a very light, pale red.

Everyone is familiar with the delicacy of its flesh, its flavor, & its fragrance.

Even though by cultivation this strawberry loses almost as much of its excellence as it gains in size, no other except the alpine one can compare with it.

The seeds are located in small recesses in the skin of large strawberries & level with it on small ones. They are the same color as the skin but a darker shade.

In a southern exposure the first crop of this strawberry plant is harvested around the end of May, & the last one in a northern exposure about mid-August.

II. *Common STRAWBERRY PLANT with white fruit.* C.B.P.

Common STRAWBERRY PLANT with white fruit.

White wild STRAWBERRY PLANT. White STRAWBERRY PLANT. Du Ch.

THIS STRAWBERRY PLANT is a variety of the preceding one. It differs from it in the following ways: 1°. The leaves are lighter green, & the tips of the teeth are white. 2°. The runners have no trace of red. 3°. The skin of its fruit is white; it yellows slightly when ripe. 4°. Its fruit has less flavor & fragrance. Gardeners who know how to tell it by its leaves, or who recognize its other characteristics, leave it in the wild & avoid transplanting it into gardens.

II. *Common semi-double flowered STRAWBERRY PLANT.*

Common semi-double flowered STRAWBERRY PLANT.

Multiple flower wild STRAWBERRY PLANT. Double STRAWBERRY PLANT. Du Ch.

THIS is another variety of the same strawberry plant; its distinguishing feature is the flower. The petals number twenty to forty-five. Several rows of them are arranged in front of one another & they get smaller as they get closer to the stem. As a result, the last ones are merely very small augmentations of the stamens

whose tips are sometimes seen in the center of these little petals. Whether the stamens have turned into petals, or whether the petals have replaced them, the stamens themselves decrease to about five to ten in number. The stem supporting the pistil & the fruit that develops from it are smaller than those of strawberry plant n°.1. But the color, flavor, & fragrance of the fruit are the same.

There's no advantage to cultivating this strawberry plant, neither for its fruit that is not much bigger than the wild strawberry, nor for its flowers that are small and can't contribute any special decoration to a flower bed. As a result they're found only in the gardens of certain specialists.

In the wild & in seed plots of common strawberry plants, some strawberry plants have variegated leaves: *common strawberry plant with variegated leaves*. H.R.P. I don't believe that these should be considered a variety, because the blemish often disappears when these strawberry plants are cultivated in good soil. If it persists, it's transmitted only to the plants produced by their runners & not to the progeny of their seeds.

IV. *Common STRAWBERRY PLANT without creeping runners (like small branches).*

Common STRAWBERRY PLANT lacking runners. Du Ch.

STRAWBERRY PLANT without runners.

It's noteworthy that in beds of cultivated strawberry plants, the plants that put out lots of runners don't throw out many suckers, and most of their offshoots don't grow upright shoots. Doubtless this is because the material necessary for their formation is absorbed by the runners themselves; they can be thought of as kinds of sucker shoots that only propagate the strawberry plant to the detriment of fruitfulness. The special feature of the strawberry plant without runners is that its offshoots form a very wide bush,

& a large number of them produce fruit. Since these offshoots are crowded close to one another, they grow a little taller than those of other strawberry plants, & their leaf stalks grow longer. For this reason it's sometimes called the *bush strawberry plant.* The other parts of the plant are similar to those of strawberry plant n°.1, which makes it a stable & very highly regarded variety; it perpetuates itself without degenerating by putting out offshoots & by seeds. The first examples of this strawberry plant were discovered in the wild & transplanted to gardens, where they're still all too scarce. If the common strawberry plant & the *fraiserat* [*Translator's note*: a common name for the sterile strawberry plant] interacted with each other in some way, I'd suspect that this is the product of it. It combines the qualities of this strawberry plant with the advantages of growing suckers & not putting out runners.

V. *Common STRAWBERRY PLANT with simple leaves.*

Common STRAWBERRY PLANT with simple leaves.

Single-leafed STRAWBERRY PLANT. Versailles STRAWBERRY PLANT. Du Ch.

M. DU CHESNE Jr. sowed seeds of the common strawberry plant in 1761 and obtained a variety with simple leaves that is consistently propagated by seeds & by runners. Its offshoots are a little longer, the upright shoots are branchier, & its flowers more susceptible to the various irregularities noted above in the general description.

But the most characteristic feature is that very few of the leaves, & only those on some of the plants, are divided into two or three leaflets as on other strawberry plants. The others are simple, indented fairly uniformly and deeply to form three sections, or unevenly to form two. The rest (they're in the large majority) are simple & entire and open up very widely. They form two large lateral leaflets on their sides that are joined onto the same vein, or more correctly, three leaflets of an ordinary leaf arranged so that the central leaflet is placed

over the two lateral ones and conceals their tips. The sides of this leaf are so broad that at the time that they open up they often overlap each other & cover the end of the stalk. Or they're joined like flags, demonstrating, as M. du Chesne says, that "this leaf is not simple because the two lateral leaflets are suppressed, but on the contrary, they're merged with the central one". The veins, like the ones on the Versailles strawberry plant, make almost a right angle with the midrib, just as they do on the large sides of lateral leaflets. Rudiments of leaflets that originate on some leaf stalks of strawberry plants suggest that each lateral leaflet is the result of several of them being joined together, & that the leaf of the strawberry plant could be made up of five or more leaflets. This is found on some strawberry plants, & especially on a green strawberry plant recently obtained by M. du Chesne.

Frequent casualties among the flowers & the fruit of the Versailles strawberry plant are the result of the great vigor of strawberry plants. Nevertheless, judging by the fewer and smaller leaves on each of its offshoots compared to the common strawberry, & by its thinner stalks & runners, this one doesn't seem to grow with such great force.

VI. *Garden STRAWBERRY PLANT.*

Cultivated STRAWBERRY PLANT. Fressant's STRAWBERRY PLANT. Du Ch.

Strawberry plant nurseries have been cultivated carefully for a long time in several villages near Montlhéry [*Translator's note*: a historic town in a market garden region about 25 km. south of Paris]. This is where the residents of Montreuil & many gardeners get plants for their strawberry beds. They're called the *Ville-du-bois* or *Villebousin* strawberry after the villages where they're grown,

or more commonly the *Montreuil strawberry plant.* M. du Chesne calls it *Fressant's strawberry plant* from the name of the first nurseryman who cultivated it. Is it a different type than the common strawberry plant? Is it a variety of it? If it throws out a few more suckers, if its leaves are somewhat larger & their stalks longer, if the fruit is bigger & generally more distorted and its flowers & the sections of the calyx more subject to certain abnormalities, all the differences are very small in one direction or another so that one can't determine a point or stage that's particular to each one. Perhaps to some degree they should simply be attributed to the method of cultivation. Indeed, a common strawberry plant transplanted from the wild into good soil in a kitchen garden grows as big, or almost as big, as a Montreuil strawberry plant, & some of its fruit also reaches the same size. This happens especially when the former had been taken from an area where charcoal was produced or where there was some other activity where ash fertilized the soil. It's no surprise that the same strawberry plant raised & cultivated in improved & well-prepared soil does much better all around when brought into a kitchen garden. This is particularly true for the soil of Montreuil & its vicinity, where the residents combine the benefits of the soil, that seems to be created expressly for strawberry plants & peach trees, with long experience & admirable expertise in cultivation. In ground less favorable for strawberry plants, the Ville-du-bois plant offers very little or no advantage at all over one from the wild, & the fruit is always less fragrant. Even though these differences aren't very great & can be unpredictable, nevertheless this strawberry plant is believed to be a definite variety of the wild strawberry plant. A sub-variety of it has white fruit.

There's another more highly regarded cultivated variety of it that has bigger fruit, more fragrance, & is a very deep red-brown. It's called *Big black.*

VII. *Smaller Alpine STRAWBERRY PLANT, always in bloom and bearing fruit.*

Alpine STRAWBERRY PLANT. (Pl. II.)

STRAWBERRY PLANT, always in bloom. Everbearing STRAWBERRY PLANT. Du Ch.

THIS STRAWBERRY PLANT clearly differs from the common strawberry plant in several ways. Its almost constant productivity & its size, that even in the best of cultivated soils barely matches that of common strawberry plants in the wild, are enough to make the distinction.

Its stem isn't very high. Some of the buds that form under the axillae of its leaves produce runners that are very slender but forceful, with nodes not very far apart from one another. These give rise to new plants that, as soon as they've put out some leaves, & often before they're rooted in the ground, begin to bloom, unlike plants arising on runners of the common strawberry plant that don't bloom until about a year after they've appeared. Other buds produce upright shoots, sometimes as many as four or five on the same stem. Some buds, a small number of them, yield new offshoots that are very weak & unable to form good-looking plants unless care is taken to mulch them so that they take root & get from the ground the nourishment that the mother plant hasn't sufficiently supplied. Consequently, offshoots of this strawberry plant aren't propagated by cultivation. This contrasts with the common strawberry plant that in the wild is often just a single plant, but throws out lots of suckers under cultivation.

The leaves are about the same size as those of the common uncultivated strawberry plant. The leaflets of the largest ones are at most twenty-five *lignes* long by fifteen to eighteen *lignes* wide. The outer & inner sides are covered with extremely short & not very thick hair, but it's more noticeable than it is on leaves of the common strawberry plant. The denticulation, arrangement of the veins, &c.

are the same. The hair on the leaf stalks, runners, & upright shoots is longer & thicker.

The upright shoots are slender, rarely grow higher than six inches, & don't divide into many branches. The flowers emerging from the first nodes on the uprights are about six-&-a-half *lignes* in diameter. In rare cases they have supernumerary petals. But almost all of the small indentations of the calyx split further, & the first nodes rarely fail to produce a leaf.

The fruit is bigger than the best looking wild strawberries. The ones that emerge from the first nodes of the upright sometimes are close to eight *lignes* in diameter by more than nine *lignes* high. They're very elongated. The roundest of them always come to a point & are not flattened at the ends. However, plants that start to degenerate produce spheroidal ones that are very flat at the ends. The first fruits picked from young plants grown from seeds generally are much longer than those from plants that develop on runners of old strawberry plants. They're conical, very elongated, almost cylindrical.

The skin is a darker reddish-brown than that of the common strawberry.

The flesh has much the same flavor & fragrance & lasts longer without spoiling.

The seeds are dark brown, very numerous, situated on the surface of the skin, and are not recessed. When they're sown in March, April, or May, the fruit is harvested before winter from those plants that yield it, about four months after they've come up. In contrast, young plants raised from the seeds of other strawberry plants only bloom in the second or third year.

Even in our climate the Alpine strawberry plant never stops setting, ripening, & yielding

fruit the whole year long, as long it can be protected from severe cold, its vegetation sustained, & the winter isn't too harsh. Nevertheless, the only plentiful harvest is from May until the end of September.

More than for any other strawberry plant, it's necessary to cover the ground where this one is planted with dried moss & to renew the plant bed frequently, because cultivation will deteriorate it before long. Extremely loose soil is preferable.

VIII. *Wild STRAWBERRY PLANT with abortive hermaphroditic flower.*

Abortive wild STRAWBERRY PLANT. Du Ch.

Barren *STRAWBERRY PLANT.*

WHEN strawberry plants are pulled up in the wild, one is often deceived by the vigor of some plants that seem to promise beautiful & plentiful fruit. They're carefully cultivated, & nothing comes of them. This is a sterile strawberry plant known as the *barren strawberry plant.*

Its leaves are about the same size & shape as those of the common strawberry plant. They're a little smoother, less substantial, a deeper green, & they have more hair. The denticulation seems to be no different. They're suspended on longer & thinner stalks & thus form a taller bush.

The runners are spindly, very long, & full of nodes that proliferate this strawberry plant abundantly.

The upright shoots, branches, & pedicels of the flower buds are long & slender, almost intermediate between those of the common strawberry plant & those of the green strawberry plant, n°. 17.

Its flower looks more like that of the green strawberry plant than that of the common strawberry plant. The small sections of the calyx are elongated

& are rarely split. The inside sections close down over the receptacle after the petals have fallen off. The stamens are in good shape & their tips are full of pollen. Although there's no apparent defect in the pistils, they nevertheless abort. The receptacle completely dries up or doesn't show any complete or regular growth at all. Sometimes a single pistil, or three or four, are fertilized, & part of the receptacle that supports them enlarges & turns into something like a berry, or a partial strawberry. If the pistils are at some distance from one another, a sort of irregular fruit forms consisting of several small berries that are attached and joined together on the same stem, as with some raspberries where most of the ovaries abort. These malformed products have a slight reddish tinge on the side toward the sun.

Consequently this strawberry plant should be destroyed wherever it's found rather than cultivated & propagated.

IX. *STRAWBERRY PLANT, downy, full-flowered with largest fruit, from Chile.*

STRAWBERRY PLANT from Chile. (*Pl. III*)

Chilean STRAWBERRY PLANT. Frutiller. *Du Ch.* [*Translator's note:* the early Spanish conquerors of Chile called this plant *Frutillar.*]

This is the easiest strawberry plant of all to recognize. It has unique features that readily distinguish it from all other strawberry plants. It grows & develops slowly. It's not very bushy because it doesn't put out many offshoots, & each offshoot usually has only eight or ten leaves. Its upright shoots, runners, and leaf stalks are much thicker than those of any other strawberry plant, & the entire plant, except for the fruit & the interior parts of the flowers, is covered with long & extremely thick whitish hair.

The leaves, on stalks that are three-&-a-half

to five inches long, aren't as wide as those of the common cultivated strawberry plant & are very thick. They're pale green on the outside and accented by very prominent veins. The inside isn't as hairy as the outside. It's dark green & the grooves aren't very distinct. The central leaflet, supported on a petiole two to four *lignes* long, is rounded at the end & not very sharp at its origin. It's twenty-four to twenty-seven *lignes* long & eighteen to twenty-one *lignes* wide. The lateral leaflets are much wider near their origins than at their tips. Their length & width are about equal. The midrib divides them lengthwise into two portions, the lower one being much larger than the other. Thus all the leaflets are wider in proportion to their length than those of any other strawberry plant. The margins have teeth that are neither very sharp nor deep. Some are pointed like the shield on a coat of arms, others like an arc of a circle, some are sharper, and all terminate in a very tiny point. It's not unusual to find one or two appendages eight or ten *lignes* long & seven or eight *lignes* wide on the stalk. While the leaves are young, the leaflets retain much of the configuration they had when they were inside the bud, rolled up or hollowed spoonlike. Later on they open up & spread out more.

The upright shoots are quite straight, not very branched, & rarely have more than seven or eight flower buds, the last ones of which usually abort. The flowers at the first nodes are very large; some are more than eighteen *lignes* in diameter when spread out. However the petals are rolled up, folded, pleated on the edges, & the placement of the sections of the calyx prevent them from opening completely because they tend to be close together. After the petals fall off,

they close back down on the stem. When the fruit gets bigger, they're forced to yield & open up, but they always stay attached to the fruit without separating from it or recurving onto the pedicel. This is a common feature of this strawberry plant & of several of the ones below. The number of sections varies from ten to sixteen; some of the outer ones split lengthwise into two or three segments. Frequently the petals are more numerous than the interior sections of the calyx. The supernumerary ones are situated in a second row in front of the others. The center of the flower is occupied by a large receptacle covered by many well formed pistils in good condition & capable of being fertilized. Around its base attached to the calyx are more than forty stamens with extremely short filaments. Their tips are atrophic & lack pollen & thus can't fertilize the pistils. So the flowers that appear to be hermaphroditic are in reality only of one sex. Whether the male sexual structures became impotent during the change to a new continent; whether there is no such thing as a true hermaphrodite; whether no individual male plants exist; or whether the explorers to whom we owe this strawberry plant only picked the plants with good-looking fruit & rejected the rest as sterile, unaware that the former's fecundity depended on them, the result is that in Europe we only know plants that are female or incomplete hermaphrodites.

However, fertilization through outside sources has promoted the cultivation of this strawberry plant at several locations in the kingdom. It's planted with the scarlet, pineapple, &c. strawberry plants & sometimes it has yielded fruit in several gardens in Paris. Whether pollen from the stamens of some other strawberry plant nearby was blown onto its flowers by the wind, or whether one of its own flowers may have contained stamens in good condition & capable of fertilizing its pistils, what inevitably happened,

if it's true as several people have claimed, is that it has produced fruit that's separate from & out of reach of any other strawberry plant. Lastly, M. du Chesne discovered that the male hautbois fertilizes the Chilean strawberry plant very well. Thus the defect in its stamens & the absence of an individual male plant can be remedied.

But this strawberry plant blooms extremely late, & sometimes the first of its flowers open only at the same time as, or even after, the last of the flowers on strawberry plants that can pollinate them. Ingenuity & skill in cultivation are required to ensure the help that the flowers need to fertilize them in time. Therefore one can 1°. plant a bed of Chilean strawberry plants between two beds of pineapple, hautbois, raspberry, or scarlet, &c. strawberry plants in the hope that some of those that are slower to bloom will coincide with the Chilean strawberry plant. 2°. plant the Chilean strawberry plant in warm soil with good exposure. In March, transplant strawberry plants suitable for pollinating them into pots & keep them in a northern exposure (two ways to delay their flowering) and move them next to the Chilean strawberry plants when the latter begin to bloom. 3°. select from among the pineapple, Bath scarlet, and Virginia scarlet strawberry plants the most vigorous of those that already have yielded fruit in frames during March, & plant them between the Chilean strawberry plants. The former usually begin to bloom again in June & July, the time when the Chilean strawberry plants are flowering. Those who are dedicated to cultivating this strawberry plant will be able to find other ways to achieve the same goal. I'd forgot to test whether Alpine strawberry plants can fertilize the Chilean strawberry plant. Since they're in bloom almost all year long, they'll provide more reliably than any other one the help needed for it to become productive.

The flowers when fertilized yield bigger fruit than those of any other strawberry plant. Often the ones on the first nodes are more than sixteen *lignes* in diameter and are almost the same in height

(if the written accounts of this strawberry plant are to be believed, it bears fruit that's considerably larger). Even though the diameter of this strawberry usually exceeds its height, it nevertheless has the appearance of being slightly elongated, because it's enlarged more near the calyx than at its other end, that more often terminates in a slightly raised tip rather than in a point.

The skin is bright & smooth. It's a very light pale red on the shaded side, where some spots remain slightly yellowish white. The other side is tinged a beautiful, slightly dark red.

The flesh is firm and has exceptional flavor & fragrance, though inferior to those of the pineapple strawberry. I've held some of these strawberries for about eight days without any deterioration.

It doesn't have very many seeds. They're reddish-brown, very big, and protrude above the surface of the skin.

This strawberry plant does poorly in cold, damp, compact ground. Soil that is warm, loose, and sandy confers vigor on the plant and size & fragrance on its fruit.

X. *STRAWBERRY PLANT large flowered, larger, slightly scarlet fruit with recessed seeds in small places in the skin, from Bath.*

STRAWBERRY PLANT Bath Scarlet. (*Pl. IV.*)

THIS STRAWBERRY PLANT, called by some gardeners *big scarlet, double scarlet,* & better known as *Bath scarlet,* for the town in the county of Somerset where apparently it was first cultivated, appears to be the largest of all the strawberry plants. Although it looks very different from the Chilean strawberry plant, nevertheless on closer scrutiny one might suspect that it originated from it. The two might even be confused in springtime when the new leaves, vigorous runners, & their thick, short upright shoots haven't yet grown to full size,

if all of these structures on this plant didn't have much less hair.

When the quality of the soil & the presence of shade are favorable for growth, the leaves, on large stalks seven to eight inches long, open up very wide. The leaflets are more than four inches long & more than three inches wide. Many of the leaves consist of four large leaflets about four or four-&-a-half inches long & two-&-a-half to three inches wide. The midrib divides the two lower ones very unequally lengthwise & the other two less equally than the central leaflet of an ordinary leaf. The denticulations, which are large in proportion to the size of the leaf, are formed like arcs that are quite curved and terminate in very sharp claws. The leaf material is thick & sturdy. The veins & grooves aren't very conspicuous. The surface is smooth & shiny, although a very large number of small furrows that meet & cross one another in different directions makes it look almost like morocco leather. The central leaflet is almost racket-shaped; it's rounded at the tip & narrows almost uniformly toward the petiole which is three to eight *lignes* long.

The upright shoots are very big & are oriented obliquely rather than vertically. At the time that the first flowers open, they're only six to twelve *lignes* long from the origin to the first node. When the fruit is ripe, they're eighteen *lignes* to three inches long. They divide & subdivide into several branches & pedicels & rarely bear more than ten flower buds. The last of these don't open up at all, or they bloom but don't set fruit. Consequently the yield of this strawberry plant is mediocre.

The flowers are large. Those on the first nodes of an upright shoot

are up to fourteen *lignes* in diameter. The pedicel inserts into a recess in the bottom of the calyx that indents further as the fruit enlarges. The sections of the calyx, numbering ten to fourteen, are wide and a little shorter than the petals. The length & width of the petals are almost equal. Some are hollowed; others are rolled or fold up in different ways. They get much narrower near the tip that's almost pointed at the end. They number the same as the interior divisions of the calyx; supernumerary ones are rare. The tips of the twenty-five to forty-two stamens are of average size. They're supported on filaments no longer than two-&-a-half *lignes*. The receptacle, only about two *lignes* in diameter, is small compared to the other parts of the flower. It's covered with pistils that have quite long & extremely slender styles. These flowers emit a very discernible scent. When they've faded, the sections of the calyx close up on the receptacle like those on the preceding strawberry plant, but when the fruit has reached its full size, they separate from it more.

Some of the fruits are spheroid, others are ovoid. Some plants produce only one of these two forms. On others they're mixed, some elongated, others more or less round. The diameter of the large round fruit is about twelve or thirteen *lignes* & they're about ten *lignes* high. The large ones of the long fruit are about twelve or thirteen *lignes* high, & their diameter is the same as their most enlarged part. The stalk is thick and twelve to fifteen *lignes* long.

The skin on the side toward the sun is a scarlet red, not very dark, & the seeds are reddish brown. The other side is lightly tinged with red, & the seeds are scarlet red.

The leaves grow much higher than the upright shoots & screen most of the fruit from the sun. The most exposed side of the fruit

frequently is only light red, & its seeds are bright red. The underside stays white or a very light red shade blended with yellow. The seeds are light red or yellow, almost straw-colored.

The seeds are small and are in small recesses or cavities normally as deep as the diameter of the seed but often deeper.

Its flesh isn't as firm as that of the Chilean strawberry. It has a pleasant taste & fragrance.

This strawberry plant likes the same soil as the Chilean strawberry plant.

XI. *Bald STRAWBERRY PLANT with smaller scarlet fruit and recessed seeds set deeper in small places in the skin, from Virginia.*

Virginia Scarlet STRAWBERRY PLANT. (*Pl. V.*)

Virginia STRAWBERRY PLANT. Scarlet STRAWBERRY PLANT. *Du Ch.*

For a long time this strawberry plant in our gardens has been known as the *scarlet strawberry plant, little scarlet, Holland strawberry plant, Barbary strawberry plant, Capron, &c.* Its numerous & very leafy offshoots make it bushier than most of the other strawberry plants.

Its leaves are large, a slightly bluish-green on the inside & lighter on the outside. The teeth are longer, narrower, & sharper than those of any other strawberry plant. The leaflets, often more than five inches long by three-&-a-half inches wide and narrow near their origin have a very distinctive elongated shape. The veins are very delicate, not very prominent, & the grooves corresponding to them are more superficial than indented. Also, the leaflets aren't well supported; they're reflexed outward & curl up inward. The material of the leaf is firm but very thin. The surface is smooth. They're held on quite short stalks that have more hair

than is present on other parts of this plant, that in comparison to the others, appear to have none at all.

The runners are long & vigorous; they're green bordering on yellow & infrequently tinged with red. Since it puts out as many runners as it does suckers, it proliferates abundantly.

The upright shoots almost always grow on a slant & lean toward the ground. They're extremely short, one to three inches at most up to the first node. They rarely bear more than ten flowers (generally from four to nine). The pedicels are long & thin & insert into a recess in the calyx.

The large sections of the calyx are long, narrow, & terminate in very sharp points. The exterior ones often split into two or three. The first flowers on each upright shoot are about nine *lignes* in diameter & almost always have six or seven evenly placed petals. Consequently there are twelve or fourteen sections in the calyx. The petals are ovoid in shape; they're much narrower at the end than in the middle. The rest of the flowers are six or seven *lignes* wide & rarely have more than five petals. They're shape is more rounded. The tips of the stamens are small & are supported on long & very slender filaments. The receptacle is small but it grows quite fast, so that the fruit ripens fifteen days sooner than our common strawberries do.

After the petals have fallen, the small sections of the calyx stay oriented pretty much the same way as they were during the time that the flower opened up, forming a right angle with the pedicel. But the large sections close up almost entirely & remain attached to the fruit until it's ripe. So all the sections, large & small, point in different directions; some remain lying flat on the fruit, others are reflexed onto the pedicel, and others twist around in different directions.

The largest of the fruits rarely are more than nine *lignes* in diameter, & their height is almost the same. They're shaped approximately like a section of an egg. The ones that grow near the end of the upright shoot are much smaller, & their tips are blunter.

The skin on the side in the sun is a beautiful bright scarlet red, & the seeds are reddish brown. The other side is a pale scarlet red often mingled with yellow in some places. Some of the seeds are light red and others are pale yellow.

The flesh, though very soft, isn't very delicate. Its scent is unique; it's fairly pleasant when this strawberry is eaten by itself but very good when mixed with common strawberries.

The seeds are set into recesses or alveoli, sometimes twice as deep as the diameter of the seed itself, & edged around by very prominent projections in the skin that make the surface of the fruit very uneven.

This strawberry plant is easily distinguished from all the others. It doesn't even resemble the Bath scarlet except in name & somewhat in the color of its fruit. It succeeds well in all kinds of soil & in all exposures. It takes to the artificial heat of hothouses & frames. After it has produced fruit in them in March & April, if kept for a while in the shade & subsequently planted in open ground, it yields a plentiful second crop in September.

Some gardeners attribute to this strawberry plant a variety they call *Canada scarlet*. The flowers are larger - some are an inch in diameter - & the petals are rounder at the tips. Its upright shoots are even shorter (most are only six or eight *lignes* up to the first node). They're generally more slanted & bear more flowers, from twelve to fifteen. The fruit

seems to have somewhat better fragrance. But all these differences aren't easy to pin down & aren't equally discernible on all of the plants, so I'm not sure that they're enough to constitute a variety.

XII. *STRAWBERRY PLANT with large flowers and fruit with flavor & fragrance that resembles pineapple.*

Pineapple STRAWBERRY PLANT. Du Ch.

Pineapple STRAWBERRY PLANT (*Pl. VI.*)

IF this strawberry plant hadn't actually been seen to originate from seeds of the Chilean strawberry, it would be difficult to guess its origin. It bears less resemblance to its parent than it does to the Bath scarlet.

The runners, upright shoots & leaf stalks are almost as big as those of the Bath strawberry plant. The leaves are a little smaller. They're the same shape and the same shade of deep green on the inside & a bluish light green on the outside. Their denticulation is a little deeper & less blunt. Their surface is smoother & doesn't look as much like morocco leather. The petioles of the leaflets are longer. Lastly, the leaves & all other parts of the plant have more hair but much less than that on the Chilean strawberry plant.

The upright shoots grow straight. When they bloom, they're about three inches in height up to the first node. From the ochrea of this node, which usually is associated with a simple leaf, from two to five branches emerge, each one of which divides into two or three pedicels that terminate in a flower bud & rarely branch out any further. The bud is big, short, and very much enlarged near the pedicel.

The flowers, almost as large as & more uniform than those of the Chilean strawberry plant, are fundamentally different from them in that both sexes are expressed together, making them completely hermaphroditic.

The ten to sixteen sections of the calyx are extremely large. The small ones sometimes are split further into two or three. As a rule there are six or seven petals, rarely five. The petals are a little longer than they are wide; they're narrowed at both ends and aren't concave. When the flower is completely open they fold differently & curl up underneath.

The filaments of the stamens, one or two *lignes* long, have extremely large tips. The stem is thick, tall, & at its end it resembles the small end of an egg.

The shape of the fruit is very variable. Some (the majority) are ovoid. Others are spheroids and very flat at the ends. Some are irregular, flattened lengthwise, & terminate in several points. These are arrayed one next to the other, making the tips of these fruits extremely wide & flat. Lastly, there are quite a few with a diameter much larger than their height. They're very swollen at the calyx end and terminate at the other end in a tip with sides slightly more convex than a gothic arch. The pineapple strawberry is much smaller than the Chilean strawberry and almost the same size as the Bath scarlet. The stalk is attached to the calyx inside a wide & deep recess. The sections of the calyx remain attached to the fruit & separate from it much less than do those of the Bath scarlet.

The skin is smooth & bright. The shaded side is somewhat yellowish white, lightly tinged with red, & the seeds are red. The side in the sun is pale red, a blend of reddish brown & yellow, & the seeds are reddish-brown.

The flesh is less firm & has less freshness than that of the Chilean strawberry, but its juice is plentiful and has a very pleasant flavor & fragrance like pineapple.

There aren't very many seeds. They're bigger than those on the Bath strawberry, smaller than the ones on the Chilean strawberry, & protrude from the skin the same way. Some are embedded in it ever so slightly.

Note. The illustration of this strawberry plant shows only one leaf of average size & a leaf that's emerging. The fruit attached to an incomplete stem doesn't have the usual shape for this strawberry. This figure can be supplemented by the one for the Carolina strawberry plant whose stem & fruit, though a bit larger than normal, represent those of the pineapple strawberry plant quite well.

This strawberry plant & the following one soon deteriorate & die in compact or clayey soil.

XIII. *STRAWBERRY PLANT with large flower, from Carolina.*

Carolina STRAWBERRY PLANT (*Pl. VII.*)

THIS STRAWBERRY PLANT looks so much like the previous one that it's hard to tell it apart without careful scrutiny. 1°. All parts of it are a little smaller than those of the pineapple strawberry plant. 2°. It has much less hair. 3°. Its upright shoots are shorter. 4°. Its flower buds are more elongated & less swollen. 5°. The sections of the calyx are larger, & the small ones are rarely split. 6°. The petals are a little less wide, & in most flowers there are never more than five of them. 7°. The stem doesn't seem to be as thick. 8°. The fruit is smaller, usually uniform in shape, and takes on a little more color. Its exceptional fragrance however isn't as pleasant as that of the pineapple strawberry, which it greatly resembles. 9°. In seed beds of pineapple strawberries a clearly distinct variety has never been found,

whereas seeds of the Carolina strawberry plant have produced strawberry plants that differ greatly in their flowers, their fruit, & in all the other parts of the plant.

XIV. *Rough STRAWBERRY PLANT with female flower and musk-scented purple-colored fruit.*

Female hautbois. (*Pl. VIII.*)

Musk-scented *STRAWBERRY PLANT.* Hautbois. *Du Ch.*

Gardeners mistakenly use the name of this strawberry plant to denote strawberry plants that have degenerated and have fruit that is big but flavorless or that has an unpleasant taste. It's a mistake to believe that strawberry plants change as a result of cultivation & degenerate into the hautbois. The hautbois is a well-defined species or line that propagates itself true to form via runners & seeds. It retains its unique features that clearly distinguish it from other strawberry plants. If it's cultivated so little that most gardeners don't know of it other than by name, it's more likely due to its sterility for which they don't know the cure than to the quality of its fruit. Under other names that shield it from popular prejudice, it's respected & carefully cultivated in some gardens.

Its vegetation, attributable to the quantity of its offshoots & their leaves, is fuller than that of any other strawberry plant, except for the strawberry plant without runners. Its upright shoots, runners, & its leaf stalks are much longer & thicker than those of the common cultivated strawberry plant & have thicker & rougher hair.

The leaves, on stalks seven to eight inches long, are much larger than those of the common strawberry plant, & the leaflets are longer in proportion to their width. The middle one is sometimes more than four inches long by three inches nine *lignes* wide. It gets much narrower or contracted at the ends,

but less so at its origin than at the tip. The lateral leaflets are the same width near their petiolules, not quite as long, & terminate in a narrower point. Their margins have long teeth ending in sharp points with sides in the form of very curved arcs. The inside is light green, slightly yellow; the outside is whitish green. The outside has raised ridges that give rise to a very large number of highly protruding small veins, & the inside is deeply indented to the same extent by corresponding grooves. Thus the surface of the leaves is rough to the touch, & they have none of the gloss of the leaves on American strawberry plants.

Its big stems grow straight up and bear on their first node a single leaf consisting of three quite large leaflets. They divide & subdivide into several branches & pedicels that support from nine to fifteen flower buds. Since almost all of them are at the same height when they open, & most of them open at the same time, they form a sort of bouquet above the leaves. That is why in some locations the hautbois is called the *bouquet strawberry plant*.

The first flowers are ten or eleven *lignes* in diameter; the last ones are about six to nine. The inner sections of the calyx are large & wide. The small ones are about half the size & very rarely split. As soon as the flowers open, all of these sections are reflexed outward & bend back toward the pedicel. The petals, normally not more than five in number, are large, well rounded at the tip, and slightly wider than they are long. They're very pure white, except for the unguis that has a beautiful light yellow tinge. At first they're concave. Later they smooth out & are reflexed outward onto the sections of the calyx. This further uncovers & reveals the receptacle which is very big, very high, & covered with a large number of pistils in good condition. The filaments of the stamens are very thick at their base.

Most are only about half a *ligne* long. They terminate in tips that are so tiny that they would scarcely be seen if they weren't edged in dark brown. These atrophied tips don't contain any pollen necessary for fertilizing the pistils. In addition neither the ovaries nor the receptacle show any growth at all, & the flower doesn't turn into a fruit, unless it's fertilized by a male plant of its own species or by a hermaphroditic American strawberry plant. We are further indebted to M. du Chesne for this discovery that freed this strawberry plant from the disrepute of sterility. Cultivators aware that its flowers are not hermaphroditic will propagate the female ones. They'll decrease the number of male plants that they might have preferred because of their vigor & ease of propagation, and they'll reduce them to a quarter or a sixth of the number of females in each plant bed. Those who have pineapple, Bath scarlet, or Virginia scarlet strawberry plants will get rid of their male hautbois altogether and plant one or two rows, or even only a few of the former plants, in the beds of the female hautbois. They'll get the same benefit without consuming their time & their ground for unproductive cultivation of sterile strawberry plants.

Fertilized female flowers become fruit that's very adherent to the calyx. It's almost ovoid in shape; the largest part is closer to the calyx than it is to the other end. The diameter of the largest ones is nine to eleven *lignes* & their height is about the same. The skin on the side in the sun is purple-red, sometimes quite dark & bordering on violet. The other side is lighter, & some spots frequently are yellow or whitish. The flesh is firm & the juice is not very plentiful. In cold & damp soil its flavor & fragrance are mingled with honey & musk and are not very pleasant. Growing it in warm & loose soil can garner for this strawberry more appreciation than it customarily gets. The seeds are big.

They're dark brown on the side in the sun and lighter or yellow on the shaded side. Sometimes they're situated in small, not very deep recesses.

When M. du Chesne planted seeds of the hautbois strawberry plants, they produced male & female individuals in approximately equal numbers.

XV. *Rough STRAWBERRY PLANT with sterile male flower.*

Male hautbois strawberry plant.

The essential difference between the male and female hautbois strawberry plants is in the flower's stamens. In the male the filaments are two to three *lignes* long; the tips are extremely big & are full of germinative pollen. The defects in the pistils aren't at all apparent, & the reason for their sterility is unknown. They seem to be just as well formed as those in the female hautbois flowers. It's only when they dry up after the flower has faded that they reveal what couldn't even have been suspected while it was alive. The receptacle is very much smaller & isn't as high as the one in the female hautbois flower. However, all other parts of this strawberry plant, runners, upright shoots, leaves, petals, &c., are larger than those of the female hautbois, the inevitable consequence of the greater vigor of this sterile individual than that of the female plant which is exhausted & weakened by its productivity.

XVI. *Rough STRAWBERRY PLANT with female flower, red fruit, flavor of berries of Mt. Ida.*

Raspberry STRAWBERRY PLANT.

The two sexes of this strawberry plant are on separate individual plants as in the hautbois. It's so completely similar to that one in every respect that I won't even describe it. I'll merely point out the distinguishing features.

Its fruit, the same size & shape as the hautbois, is cherry-red on the side in the sun, & the seeds are brown. The shaded side is a pale light red or a beautiful yellow, & the seeds are red or straw-colored. The flesh is very tender, & the juice is plentiful. It tastes a bit like wine & its scent resembles that of raspberries. On some fruits the seeds are quite recessed; on others they protrude considerably. The last fruits at the ends of the upright shoots are flattened at the ends, having the same shape as the common strawberry. Though the upright shoots are very stout, when they're full of fruit they have to be supported by rods. I believe that in England the plant is called *Hautboi*.

It's claimed that this strawberry plant originated in America, & it's presumed to be a parent or a variety of the hautbois. It deserves to be cultivated & propagated. It's less afflicted by cockchafer grubs than are other strawberry plants.

I haven't been able to find any difference between the male individual & that of the hautbois. The plant is fertilized by all of the strawberry plants that can do the same for the hautbois.

Another strawberry plant called the *apricot strawberry plant* is cultivated in some gardens. It's distinguishable from the hautbois only by its fruit. One side of it is a deep red-brown, & on the other it's a waxy white or lightly tinged with red. Its flesh is soft but the flavor & fragrance are very faint. So in this respect these strawberries are very much inferior to the raspberry-strawberries & their only advantage over the hautbois is their tenderness.

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XVII. *Slender STRAWBERRY PLANT with somewhat green flower & fruit.*

Green STRAWBERRY PLANT. Du Ch.

Green STRAWBERRY PLANT. (*Pl. IX.*)

THIS STRAWBERRY PLANT has been cultivated for a long time in England & recently has become known in this country. It has great vitality, puts out many suckers & even more runners. Its upright shoots, runners, leaf stalks, & all other parts are extremely slender. They have hair that's quite long but not very thick.

Its leaves are much less broad than those of the common cultivated strawberry plant. The central leaflets on the largest of them are only thirty-two or thirty-three *lignes* long & two inches wide. The lateral leaflets are three or four *lignes* less in each dimension. They're divided lengthwise by their midrib into two sections less unequal than those of other strawberry plants. But appendages or rudimentary leaflets are as common on the leafstalks of this strawberry plant as they are rare on other strawberry plants. The denticulation is large, deep, & very sharp. The outside of the leaf is whitish-green & accented with very prominent veins. The inside is a slightly deeper green than in the common strawberry plant, & the furrows corresponding to the veins are extremely deep. The leaflets inside their buds are folded like fans before they emerge, and they retain the pattern of these folds longer & more distinctly than do those of any other strawberry plant. The leaves and their stalks, the upright shoots, runners, &c. are covered with quite thick hair.

The upright shoots, their branches, & pedicels are very long & bear eight to fifteen flower buds. The buds are long & slender. The flowers on the first nodes are nine or ten *lignes* in diameter. The inside sections

of the calyx are longer than the petals. Most of the small sections split into two or three. The petals, more oval at their tips than they are round, at first are hollowed spoonlike. But after the flower is completely open, they flatten out & their edges form different folds & contours. When the flower has newly opened the petals are a herbaceous color or pale yellowish green. Some of them subsequently retain this color. Others lighten except at the tips, & turn a white that isn't pure but rather mingled with a light tint of green. Some of them often remain attached to the calyx and don't dry up until the fruit ripens. The filaments of the stamens are thin & extremely long, & their tips are big and light yellow. The pistils are sulfur-yellow or very pale with a slight hint of green. All the flowers on an upright shoot are almost at the same height and form a sort of terminal bouquet that rises above the leaves. When the flowers have faded the large sections of the calyx close back onto the receptacle as they had been before the flowers opened and remain permanently inclined on or adhered to the fruit. When the fruit has reached full size, some of them move somewhat away from it & their tips often reflex or fold back.

The fruit is about the size of the ones gathered in the first year from the common cultivated strawberry plant. The biggest ones rarely exceed eight *lignes* in diameter by six-&-a-half *lignes* in height. They have a spheroid shape, very much flattened at the ends, frequently uneven and almost never well rounded at the diameter. The pedicel inserts into quite a deep cavity, & the fruit is very adherent to the calyx.

The skin is lightly shaded red-brown on the side in the sun. The other side is green that whitens a little when the fruit is ripe.

The flesh is slightly firm & crisp when this strawberry plant

is planted in a good exposure & not in warm soil. A bell-glass or frame helps it to ripen, improves it, & makes it tender & delicious.

It has a very pleasant flavor & fragrance depending on how ripe it is.

The seeds aren't very numerous because most of the ovaries have aborted. They're situated in recesses almost as deep as those of the scarlet strawberry.

The fruits ripen almost all at once which greatly reduces the time available to harvest them. But this is a small drawback; it's not unique to this strawberry plant and it doesn't make it any less worthy of being more widely cultivated. In soil & during seasons that are cold, it's susceptible to mildew, a disease that sometimes spreads as far as the fruit & gives it an unpleasant moldy taste.

In M. du Chesne's fine strawberry plant collection, there are three other green strawberry plants that seem to me to be superior to this one in the quality of their fruit & in their increased ability to ripen completely. One of the three is remarkable on account of its leaves, a large number of which consist of five or six leaflets. M. du Chesne suspects that the hautbois originated from the green strawberry plant. An eminent gardener assured me that he observed that the latter originated from the raspberry-strawberry plant.

CULTIVATION.

I. THE STRAWBERRY PLANT is propagated by seed planting, detached offshoots, & by new plants produced by runners.

1°. The seeds should be collected from the best-looking & most shapely strawberries that are fully or even overripe & that are dry at the base. They can be sown from March until the beginning of August. (If they're sown any later, most of the seeds only come up after the winter is over, otherwise the seedlings wouldn't be strong enough

to withstand the severe cold). A small area of loose & friable soil is tilled. The surface is smoothed & fully watered. The seeds are sown immediately, & an amount of pulverized friable soil sufficient to cover them to a depth of about half a *ligne* is sifted over them through a horsehair sieve. This pulverized soil sifted onto the wet ground becomes sufficiently moist & clings to the seeds. Then everything is covered with a straw mat or with long straw, & from time to time it's lightly watered on top to keep the seeds moist enough to germinate. From ten to twenty days thereafter, when some of the seedlings are seen coming out of the ground, the straw matting is removed & raised up in front to protect the seedlings from being dried up by the sun. Strawberry plants can be sown in pots the same way. M. du Chesne's work includes several other methods for making these seed beds. The young strawberry plants are weeded, watered, & allowed to strengthen. If they've grown five or six leaves before November, they're transplanted to a nursery. They're planted separately five or six inches apart, or three or four plants grouped together with eight or nine inches between each group. If they're too weak, the transplantation is postponed until the following March or April. The planting stays in the nursery until October or November. During the summer it has to be weeded, hoed, watered, thinned out, &c.

2°. Runners of strawberry plants produce new plants suitable for propagation. If only a few plants are needed, the runner is pinched off after the second offshoot that's grown from it so that the two offshoots will benefit more. If a lot of plants are needed, the runners are left to grow according to their own energy & fecundity. They'll produce many young plants to be pulled up around mid-November and planted right away on location at suitable distances apart.

But following the example of the residents of Montreuil, the expert growers of this plant, it's preferable to set them out twice, in other words to plant them very close to one another in rows from which they'll be taken around the beginning of April to be planted in beds. It would be even better to put them in a nursery for a year in soil of poorer quality than that in which they eventually will be cultivated. What the fruit loses in size, it will gain in fragrance.

3°. The base of the plant is mulched again after the strawberries are harvested to allow the offshoots to take root. By November these offshoots, when detached and put in place as soon as possible, will form a very fine plant bed, preferable to one that develops from runners. This is the way that strawberry plants without runners usually are propagated.

Beds of common strawberry plants taken from the wild are planted on location right away without being replanted a second time or put in a nursery. That's how their cultivators do it.

Beds of the Alpine strawberry plants, raised from seeds or from runners, also are set out on location without staying over the winter or in a nursery, because they bloom a year earlier than do other strawberry plants.

II. Good free, friable, loose soil that isn't dry is the most suitable for strawberry plants. They succeed fairly well in all kinds of soil depending on how closely it resembles this. This type of soil doesn't need any fertilizer. Soils of lesser quality are composted & fertilized if the size of the fruit is preferred over its fragrance. It's common knowledge that strawberries gathered in the wild are the tastiest & that their quality declines as they get bigger under cultivation.

In hard & compact earth, where strawberry plants, especially those from America, can't survive, the beds or plots are tilled & trimmed. Then small parallel furrows, six inches wide

and the same in depth, are dug lengthwise, corresponding to the number of rows of strawberry plants that are planned. They're filled with good, loose, sandy soil.

The soil, regardless of whether it's new or previously had been occupied by strawberry plants, as long as at least ten, twelve, or more years had passed since then, is dug up or tilled quite deeply to destroy all of the weed roots. It's divided into plots of desired length & the same in width (customarily about four or five feet) so that all methods of cultivation can be performed easily. A path or passage about two feet wide is left between each bed.

Lines are marked with a cord along the length of the plot to delineate the rows of strawberry plants. The first & the last rows are planted six inches from the edge of the plot. The spaces between the rows vary according to the type of strawberry plant. About six or eight inches between each row suffices for the Alpine strawberry plant.

For the common, Montreuil, & green strawberry plants it's widened to eleven to thirteen inches.

For the hautbois & the strawberry plant without runners, about twelve to fifteen inches.

For the scarlet & pineapple strawberry plants, fifteen to eighteen inches.

For the Chilean strawberry plant, about fifteen or eighteen inches if a row of these strawberry plants is planted with a row of pineapple strawberry plants to fertilize them; from twelve to fifteen inches if male hautbois are planted. In that case it's sufficient within the rows of the hautbois to alternate an hautbois plant & a Chilean strawberry plant. In such an arrangement only about a fourth of the strawberry plants in one bed will be sterile. Male & female hautbois strawberry plants are arranged in the same way.

III. With everything prepared this way,

after removing their old leaves & pruning their root tips, provided they've not recently been lifted, the strawberry plants are planted using a peg or a trowel. The distance from one plant to the next within a row should be equal to or a little less than the distance between each row, taking care to arrange the plants in a zig-zag or in a checker pattern. When a bed is fully planted, it's liberally watered, except during rainy weather, so that the earth is tamped down & the roots make close contact with the soil. If the plants are very robust, only one is planted at each spot. If they're weak or average, two of them are put in together.

This planting can be done in all seasons of the year, even during the intense heat of the summer, as long as the plants are protected from the sun & from drought. The best time is from mid-March until mid-April & even later. Some plant wild strawberry plants only in September. But since this plant is unable to strengthen & put out suckers during the winter & up until the following spring, the first harvest of its fruit can't be as substantial as if it had been planted as early as April or May.

IV. Strawberry plants planted in the spring are expected just to propagate their offshoots, to develop their strength, & to prepare to yield abundant fruit the following year. Keeping this in mind, they're tended during the first year, taking care to weed, hoe, and water them & to cut off upright shoots if some appear. Toward the end of spring, when the main flow of their sap has subsided & their growth is more restrained, all of the runners that they've produced must be cut off. Or if one wishes to recover plants from it, or to replace some plants that have died, just keep the strongest ones & pinch them off at the second offshoot. If this procedure is performed earlier, the same thing could happen to the strawberry plant as happens to a vigorous tree that has all its suckers cut off when it's full of sap. It will put out still more,

or it deteriorates. Since the strawberry plant continues to grow new runners all summer, this curtailment has to be renewed at least every month. Tilling, hoeing, watering, cutting off runners, &c. are the main tasks in cultivating strawberry plants not only during the first year, but also during the three years that they're able to survive.

V. In spring, when the upright shoots begin to appear, put straw mats up along the southern side (*) of the plant bed to protect the strawberry plants from the constant effect of the sun. They like shade & the shelter of trees. Cover the ground with leaf litter, short straw, or better, dried moss, to maintain coolness & moisture. Steady growth is sustained that way without too many waterings, which if too frequent, greatly diminish the fragrance of the fruit. This is the proper care for all types of strawberry plants. The last one especially is necessary for Alpine strawberry plants that in some areas can't survive without the continued application of moss. A large number of these strawberry plants perish after yielding their fruit, and it's most essential to preserve some of the runners & to set their best-looking offshoots between each plant or between each row to restore the plant bed & to keep it full. It's even possible not to thin out this strawberry plant at all & to obtain a lot of fruit from the offshoots on runners that produce it even before they've taken root.

At minimum it's superfluous to pinch off the tips of upright shoots & even to cut some off of strawberry plants that have more than four or five in the hope of getting better-looking fruit. A strawberry plant rarely puts out more upright shoots

(*)When strawberry plants are planted in the middle of areas that are exposed on both sides & are not in espalier plant beds or in gardens enclosed by walls, from mid-November to mid-February or later, the straw mats are put up instead on the north side to protect the plants from the cold wind, if one wants to hasten the ripening of the fruit.

than it can sustain, & the last flowers on weak plants & on most American strawberry plants abort. Or if they do set fruit, the amount that they add to the first crop won't make any noticeable difference. Furthermore, if the flowers appear sequentially, the last ones only opening when the first fruits have reached full size or are even ripe, it can't detract from their beauty.

After the strawberries have been harvested, the strawberry plants, normally with very extensive offshoots, are thinned out, hoed, & mulched again. For the rest of the summer they're watered as needed to maintain their growth. Some gardeners cut off all their leaves. But when they're completely exposed to the heat of the sun like that, many offshoots & even entire plants die if they're not re-mulched & frequently watered during dry spells.

After two crops have been harvested from the strawberry plants, they're pulled up. The ground that they've occupied can't be used again for the same purpose for another twelve or thirteen years, unless new soil is introduced & mixed with it or small furrows are dug as mentioned above.

That's a general summary of the cultivation of strawberry plants. I've left out details of several minor concerns that are adequately learned by common sense & a little experience. Cultivation in hothouses, on manure beds, in frames, &c. is not our objective here at all. Alpine strawberries can be obtained all winter long with much less care & expense without using heat from fuel or from compost that is harmful to this strawberry plant. It's sufficient to protect them from severe cold in a container covered with a glass frame. The outside of the container is furnished with long straw, moss, or even with earth to keep out the frost. At night the frame is taken off & straw mats are thrown on top during hard frosts. They're taken off during the daytime

to allow for some air if it isn't too cold. In an ordinary winter, when this strawberry plant is planted on an espalier facing south & covered with straw only during frosts, its growth & fruiting are hindered very little.

Sometimes strawberry plants are attacked by cockchafer grubs, especially in manured soil. If these insects aren't present in large numbers, the only known remedy is to search for them in the ground & destroy them. But if they're very numerous, the best thing to do is to make a new plant bed elsewhere, or to transport the rest of the plants there, taking care to cut off all the damaged parts of the roots & of the taproot. Ants & other insects do less harm to strawberry plants.

U S E S.

Strawberries are not used at all out of season. They're eaten fresh, with or without sugar. They're made into ices, alone or together with water, wine, cream, &c. They're mixed into compotes, with currant juice, & in other preparations for ceremonial occasions. Heating destroys or considerably weakens their fragrance.

Those who wish further information about this plant can consult M. du Chesne's work which includes a long and knowledgeable treatment of the nomenclature, genealogy, places of origin, characteristics, cultivation, &c. of strawberry plants.

GROSSULARIA,
CURRANT BUSH.

THERE are two kinds of cultivated currant bushes: the cluster currant bush and the thorny gooseberry bush.

I. Cluster CURRANT BUSH.

DESCRIPTION.

This bush grows fairly tall and spreads out as much as its shape and its cultivation permit.

Its shoots are long, straight, stout, & strong (assuming that it's not old or in poor ground). They're covered by a flaxen-gray epidermis with fibers that are longitudinal or oriented lengthwise along the shoot. During the winter large pieces of it fall off & leave behind a kind of powder of the same color that adheres strongly to the shoots. This covers a thin, transparent, leathery bark with fibers that circle or spiral around the shoot. Above, it's a light brown with whitish spots. Underneath it's a light reddish or onion-skin color. Below this layer there's a second thicker leathery one that's a beautiful green with similarly circular fibers. Beneath that one there's a third one that's light green, & lastly a layer of phloem, or fourth layer of bark, that's whitish, spongy, & not very firm. The fibers in these last two layers are longitudinal. Branches of old wood have no epidermis, but their four layers of bark

are of the same kind, color, orientation, & consistency as those on the shoots. The outer bark is shed every year & is replaced by a new one.

The buds of the shoots are big, long, terminate in a very sharp point, and make a very acute angle with the branch. Sometimes they're double & even triple, alternate, and quite far apart from each other except near the end of the shoot where they're closer together.

Fruiting buds & branches emerge from the insertion point & from the first buds on a pruned shoot. These branches are very short, often not even as much as six *lignes.* They have fruit buds along their whole length, especially at the ends. These buds are elongated, very pointed, and the same shape as the vegetative buds, but they're two or three times smaller.

So currant bushes, like cherry trees, have four layers of bark & three kinds of buds: for branches, for leaves, & for fruit. But on the currant bush the biggest ones are the branch buds, & the smallest are the fruit buds.

The flowers form racemes & are alternate on a common peduncle, stalk, or stem. They're attached by very slender filaments or pedicels that emerge from the axillae of sorts of scales, sheaths, or very small long pointed leaves. Each flower consists of 1°. a calyx in one piece shaped like a very wide-open cup about half a *ligne* deep. It's divided almost from the bottom into five green sections about one *ligne* long and nearly two *lignes* wide, with light yellow margins. They're reflexed outward and rolled onto the cup. 2°. five petals attached to the inside edges of the calyx between its sections. They're so tiny that they're hardly visible. 3°. five very short stamens attached to the inside walls of the calyx between the petals. 4°. a pistil with a style divided at its end into two recurved branches. It rests on an ovary

that functions as the bottom of the calyx and becomes a tender, juicy fruit.

The leaves are alternate, attached to the branch by long, stout stalks that hold them quite upright. They're simple and lobed like those of the guelder rose. [*Translator's note: Viburnum opulus.* The French name, *obier,* is derived from the Latin *opulus,* a kind of maple that has lobed leaves like those described here]. There are three large or principal lobes bordered by teeth formed of two segments of a circle & that terminate in a small, sharp point. The teeth are unequal in size. Their arrangement is such that each lobe appears to be made up of several smaller ones. The large leaves, from where they open out to the tip of the central, or largest, lobe are about three inches long, & to the tips of the large lateral lobes, two inches three *lignes*. A large prominent vein extends from the stalk to the tip of each lobe and branches out into several smaller veins. The latter subdivide & extend up to the tips of portions of the leaf margins that appear to be small lobes. The inside of the leaf is indented with quite deep grooves corresponding to the veins on the outside. The result of the protruding veins on one side and indented grooves on the other is that the leaf's surface is not very smooth. It's a beautiful green; parts of the veins are usually red, & in autumn they often turn entirely this color.

The fruit grows in clusters. The number of currants in them depends on the extent to which the flowers have aborted or have ceased to develop. The most plentiful rarely have more than fifteen or sixteen currants. They're attached to the cluster's common stem by very slender stalks about one or two *lignes* long. They're smaller near the tip of the cluster. They're round and end in an umbilicus surrounded by the dried up sections of the calyx that persist until the fruit is ripe. The skin is smooth, delicate, and transparent if its color is red or white. The flesh is tender. The juice of edible currants is tart;

sugar takes the edge off of it & makes it pleasant. Inside the large currants there are eight to twelve oval seeds about a *ligne* long and half a *ligne* wide, & in the small ones there are from four to eight of them. They're attached to a common fiber by very slender filaments.

SPECIES AND VARIETIES.

I. *Cultivated CURRANT BUSH with large red fruit.* C. B. P.

CURRANT BUSH with large red fruit. *(Pl. I.)*

[*Translator's note:* this species is now *Ribes rubrum.*]

This currant bush is larger & more vigorous than the ones below. Its shoots are big & strong & the dimensions of its leaves are larger than those mentioned above in the description of this species.

The clusters are beautiful & have a large number of currants. The biggest ones are five *lignes* in diameter and almost the same in height. The skin is a beautiful light red. The juice has a light tinge of red, & it has a pleasantly tart flavor when the fruit is thoroughly ripe.

II. *Cultivated CURRANT BUSH with large white fruit.* H. R. P.

CURRANT BUSH with large white fruit.

This is a variety of the preceding one. The only difference is in the color of the fruit & in the tartness of its juice that is much less sharp. Several gardeners confuse it with the currant bush with pearly fruit, n°.4.

Currant bushes with large currants, both the red and the white, deserve to be cultivated more than any of the others. Their fruit is pleasant to eat fresh, in compotes, & in preserves, as long as the latter are prepared before the fruit is completely ripe. Otherwise there won't be enough acidity in it.

III. *Cultivated CURRANT BUSH with large flesh-colored fruit.*

CURRANT BUSH with large, flesh-colored fruit.

This currant bush appears to be another variety of n°.1.

IV. *Cultivated CURRANT BUSH with pearl-like fruit.* C. B. P.

CURRANT BUSH with white fruit. Pearly currant.

This currant bush is a variety of the common currant bush. Its fruit is bigger & less tart. I won't discuss the other varieties that have leaves streaked with white & with leaves variegated with yellow. They are not worth cultivating for their fruit.

Lately I obtained a currant bush with sweet fruit that had leaves that were much smaller than those of the preceding ones. The material of the leaves is sturdier, & their lobes are longer.

V. *CURRANT BUSH with no thorns and with large black fruit.* C. B. P.

CURRANT BUSH with black fruit. Cassis. Pepper plant.

[*Translator's note:* the blackcurrant or cassis plant is now designated *Ribes nigrum.*]

The cassis plant is less bushy than the common currant bush.

Its shoots are a yellowish color.

The leaves are a bit larger than those of the common currant bush. Their surface is smoother & their denticulation is much sharper. The lobes are longer and terminate in a more uniform point. They have quite a strong odor. They often droop as though they were suffering from dryness.

The flowers are fashioned like those of the common currant bush. The cup of the calyx isn't very deep. Its sections are larger & tinged with light purple at their tips. The petals are larger as well. The flowers are arranged in clusters but they rarely have more than ten or eleven blossoms.

The clusters of fruit usually only have five or six currants,

rarely as many as nine or ten. This currant is bigger than that of currant bush n°.1. Its skin is firm, violet-black, dappled with tiny white spots. When crushed it yields a beautiful bright red dye. The flesh is tender, bluish white, with a sharp taste. It contains from ten to twenty hard, angular, light brown seeds.

The fruit ripens in June & July. It's of no use as food but only as a medication.

VI. *American CURRANT BUSH with black fruit.*

American CURRANT BUSH with black fruit. Virginia CURRANT BUSH.

This shrub looks a lot like the cassis plant. Its branches are thinner & its leaves are smaller.

The flowers, fifteen or twenty of them, are attached as though they were pressed against a common stem, which makes them look more like a spike than a cluster. They open up less than those of other currant bushes. The cup of the calyx, a very light green, is close to three *lignes* long. Its sections, almost white, & its petals are longer than the corresponding structures on the flower of the cassis plant. So its flowers are longer than those of any other currant bush. Even though they contain the same structures essential for bearing fruit & in the same arrangement, they look quite different.

The fruit is slightly bigger than that of the common currant bush. Its skin is the same color as that of the cassis. The juice is almost tasteless. The seeds are extremely numerous; I've counted more than fifty of them in a medium-sized currant. The fruit ripens at the beginning of July. It's more of a curiosity than it is useful.

C U L T I V A T I O N.

1°. PROPAGATING the cluster currant bush by seed planting

would take a long time & possibly might not produce satisfactory results. Its quicker & safer to propagate them by divided plants supplied with roots, by layering, & even by cuttings that take root easily.

2°. The most mediocre soil & adverse exposure are adequate for it. But it does better in good soil that's slightly damp. The fruit sets better and becomes more attractive & less sour when facing south or east.

3°. It can be shaped in all kinds of ways. It grows well on fences, as a leafy shrub or as a bush, espaliered, or as a standard tree. The latter form is preferable when there is limited space for it. It's planted in counter-espaliers or around plots in a kitchen garden lined up with other trees. From only one shoot a stem four or four-&-a-half feet tall is grown, and a top is fashioned at the tip. Since it grows above dwarf trees it doesn't take up the space that they need to spread out, and the shade it makes can't harm them. When it's full of fruit it makes an attractive sight.

4°. Each year in mid-February the dead wood & snags on the currant bush are cut off. The big shoots are pruned back to three or four buds and the medium-sized ones to one or two buds. The small fruiting branches are left intact.

5°. Currant bushes that are too old generally produce only small fruit so sour that even birds won't eat them. As soon as they appear to be in decline, they have to be pulled up & replaced with other ones. It's not necessary to go elsewhere for the plants to renew the planting. Young shoots separated from the old degenerated plants & planted somewhere else, or even in the same spot as long as the soil has been renewed, will re-establish themselves & yield beautiful fruit.

U S E S.

Currants are eaten fresh, either with sugar, or without it after extreme ripeness has sweetened them. Desserts are decorated with whole bunches of them glazed with sugar. They're preserved as currants, as jelly, and in pastries, preserves, or compotes. Syrups, refreshing drinks, &c. are prepared from them. Cherry preserves are seasoned with currants, & currant preserves are sweetened with raspberries.

To maintain currants until November, the bushes are covered with straw as soon as the fruit is nearly ripe to protect it from being raided by birds & dried out by the sun.

II. *Cultivated thorny GOOSEBERRY BUSH.* C. B. P.

Thorny GOOSEBERRY BUSH. *(Pl. II.)*

[*Translator's note*: now *Ribes grossularia* or *Ribes uva-crispa*.]

Although the habit & the whole external appearance of the gooseberry bush seem to be very different from that of the cluster currant bush, nevertheless all of its characteristics are the same. Each of its parts is distinguishable from those of the cluster currant bush only by its dimensions. It doesn't grow on a single stem, but instead a large number of shoots, most of which branch out further, emerge from its base & form an extremely full bush where the strongest shoots are about three feet tall.

1°. The shoots are straight, much less thick, and are covered similarly by a pearl-gray or almost white epidermis. Underneath it there are the same number of bark layers with the same orientations & consistencies & with somewhat lighter colors.

2°. The leaves also are arranged alternately on the shoot. They're simple and are divided into three principal lobes.

The margins are dentate with uneven teeth, of average depth, & not as sharp. The leaves are accented on the outside by quite prominent veins & indented on the inside by corresponding grooves. The largest ones are twenty *lignes* from the stalk to the tip of the central lobe, & twenty-three *lignes* from the tip of one large lateral lobe to the tip of the other one. Thus they're much smaller than those on the cluster currant bush. The stalk is big, from ten to fourteen *lignes* long. As on the cluster currant bush, the large leaf at the base of the shoot is associated with two or three small leaves five to seven *lignes* long & a little bit wider. Between these leaves there's a bud on a pedicel that lengthens in the following spring and produces a small branch about four or five *lignes* long. Four or five leaves of unequal size (the largest ones are fifteen *lignes* long & seventeen *lignes* wide) & one or more flowers emerge from its tip. The bud stem is armed with three strong, straight, and very sharp spines that form right angles with one another. They persist through the following year, associated with the small fruiting branches. They become somewhat curved, develop no further, and subsequently fall off. As a result, it's very rare to find them on three-year-old branches.

3°. The flowers for the most part are solitary. Sometimes there are two or three, & rarely four, attached to one stalk. All of the component parts of the flower & their arrangement are similar to those of the cluster currant bush, but they're larger. The bowl of the calyx is very much deeper, & its sections are tinged a light purple. A lot of the flowers have six sections, six petals, and six stamens.

4°. The fruit varies in size, shape, & color according to the variety of gooseberry bush. The stalk, from two to six *lignes* long, is attached flush with the fruit. Seven or eight fibers, more conspicuous than those on the cluster currant bush, emerge from it.

Some of the fibers divide into several smaller ones. The fibers extend right to the other end of the fruit which terminates in an umbilicus bordered by the cup & the sections of the calyx. The fruit contains a pulp or very soft flesh & from twelve to thirty seeds that are hard, osseous, brown, oval, and a little less blunt at one end than at the other.

There are several varieties of the gooseberry bush. 1°. One has big round fruit (*Fig*. 1.) that is seven to nine *lignes* in diameter and slightly more in length. A variety of it has large, long fruit (*Fig*. 2.) that is about nine or ten *lignes* high by six to eight *lignes* in diameter. While still green these fruits are used in the kitchen instead of sour grapes, for which they're a poor substitute. When ripe, the skin is yellowish. The juice is slightly sugary, or more likely tasteless, which makes the fruit undesirable. 2°. Another kind has red or dark purple fruit. Its juice is a little like wine. The fruit is suitable for children to eat & for those who don't have refined tastes. 3°. Gooseberry bushes with yellowish leaves or variegated with yellow, those with small fruit, wild varieties, &c. Some of these are appropriate only in ornamental gardens. Others are better left in hedgerows & private estates rather than being transplanted to kitchen gardens. 4°. The gooseberry bush with cluster fruit & the gooseberry bush with flowers that are not hermaphroditic but are male on one individual & female on another. This shrub is more interesting to botanists than it is to growers.

The entire cultivation of the gooseberry bush consists of planting it in one of the least used spots of a garden. From time to time some shoots are cut off so that it will be less bushy, deterioration won't impair its fruitfulness, & there will be new branches that will grow better-looking fruit.